UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

September 3, 2002

Mr. Bruce Bernhardt
Nez Perce National Forest
Route 2, Box 475
Grangeville, Idaho 83530

Re: Biological Opinion and Essential Fish Habitat Consultation for the Meadow Face Stewardship Pilot Project (One Project)

Dear Mr. Bernhardt:

This document transmits the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) for the proposed Meadow Face Stewardship Pilot Project. The Opinion is based on NOAA Fisheries review of the proposed project and its effects on Snake River steelhead (*Oncorhynchus mykiss*), in accordance with the Endangered Species Act (ESA), and its effects on Essential Fish Habitat (EFH) for chinook and coho salmon, in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSA). Formal ESA consultation was performed under the authority of section 7(a)(2) of the ESA and its implementing regulations, 50 CFR Part 402. The EFH consultation was performed under the authority of section 305 (b)(2) of the MSA and its implementing regulations, 50 CFR Part 600.

The Nez Perce National Forest (NPNF) determined in the October 17, 2001, Meadow Face Stewardship Pilot Project biological assessment (BA) that the proposed action is likely to adversely affect listed Snake River steelhead, and may adversely affect EFH for chinook salmon. This Opinion is based on information in the BA and Final Environmental Impact Statement provided by the NPNF. The enclosed document includes analysis supporting NOAA Fisheries' section 7 determination, an incidental take statement, and EFH consultation for the proposed action. Pursuant to ESA consultation, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of Snake River steelhead. Pursuant to EFH consultation, NOAA Fisheries concludes that the proposed action may adversely affect EFH for chinook salmon.

The Opinion includes reasonable and prudent measures to avoid or minimize take, and mandatory terms and conditions to implement those measures. Because the EFH consultation includes conservation recommendations, the MSA requires a written response from the action agency NPNF, describing how the conservation recommendations will be addressed (section 305(b)(4)(b) of the MSA).

Mr. Bob Ries (208) 882-6148 or Mr. Dale Brege at (208) 983-3859 are the NOAA Fisheries contacts for this consultation.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

cc: B. Ruesink - FWS
D. Pederson - USFS
J. Hanson - IDFG
I. Jones -NPT

Endangered Species Act Section 7 Consultation
Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Meadow Face Stewardship Project
South Fork Clearwater River
Idaho County, Idaho

Agency: U.S. Forest Service, Nez Perce National Forest

Consultation Conducted By: National Marine Fisheries Service, (NOAA Fisheries)
Northwest Region

Date Issued: September 3, 2002

Issued by: for Michael R Crouse
D. Robert Lohn
Regional Administrator

Refer to: F/NWR/2001/01365

TABLE OF CONTENTS

I. BACKGROUND

The National Marine Fisheries Service (NOAA Fisheries) received a biological assessment (BA) from the Nez Perce National Forest (NPNF) on October 30, 2001, requesting formal consultation on the proposed Meadow Face Stewardship Pilot Project (stewardship project). The stewardship project consists of timber harvest, temporary road construction, prescribed burning, road decommissioning, stream channel rehabilitation, soil restoration, and reduction of exotic vegetation and noxious weeds. The proposed activities would occur over a 10-year period on 27,000 acres of NPNF lands in the Meadow Creek, Wickiup Creek, and Ralph Smith Creek drainages, all of which flow directly into the South Fork Clearwater River (Hydrologic Unit 17060305). The project location is approximately 7 miles southeast of Grangeville, Idaho.

The NPNF initiated early consultation with NOAA Fisheries prior to developing the final design of the stewardship project. NOAA Fisheries reviewed and commented on several draft BAs, and discussed with the NPNF opportunities to reduce or avoid potential adverse effects to anadromous fish by clarifying or adding certain protective measures to the proposed action. The final project design reflects many of NOAA Fisheries suggestions. The following chronology lists significant meetings and correspondence in the consultation history:

- Jan. 31, 2001 - Presentation of National Environmental Policy Act alternatives by NPNF
- April 18, 2001 - Telephone call with Wayne Paradis, NPNF fish biologist
- April 24, 2001 - Presentation of preferred alternative by NPNF
- April 27, 2001 - Telephone call with Wayne Paradis
- May 1, 2001 - Telephone call with Wayne Paradis
- May 29, 2001 - NOAA Fisheries received draft BA from NPNF
- July 18, 2000 - Field review and project overview of proposed timber harvest unit in Whitman Creek drainage
- August 14, 2001 - Meeting with NOAA Fisheries and NPNF staff
- September 4, 2001 - Conference call with NOAA Fisheries and NPNF staff
- September 10, 2001 - Field review of grazing practices in Meadow Face project area
- September 17, 2001 - Meeting with NOAA Fisheries and NPNF to discuss preliminary Endangered Species Act (ESA) findings
- September 20 & 21, 2001 - Field review of harvest units in upper Meadow Creek drainage
- October 2, 2001 - NOAA Fisheries received a revised draft BA from NPNF
- October 17, 2001 - NOAA Fisheries received a final draft BA from NPNF
- October 30, 2001 - NOAA Fisheries received the final BA from NPNF
- January 29, 2002 - NPNF modified the proposed action and provided determinations of effect for Essential Fish Habitat (EFH)
- May and June 2002 - Negotiated ESA terms and conditions to balance aquatic restoration with other activities

The NPNF determined that listed Snake River steelhead (*Oncorhynchus mykiss*) and fall chinook salmon (*O. tshawytscha*), and unlisted chinook and coho salmon (*O. kisutch*), may occur in areas affected by the stewardship project. The October 30, 2001, BA concluded that: (1) The proposed action is likely to adversely affect Snake River steelhead, and EFH for chinook

salmon; (2) the proposed action would not adversely affect EFH for coho salmon; and (3) that there is no effect on listed fall chinook salmon or its designated critical habitat.
The objective of this Biological Opinion (Opinion), pursuant to the ESA, is to determine whether the proposed Meadow Face Stewardship Pilot Project is likely to jeopardize the continued existence of Snake River steelhead, and pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA), determine if the stewardship project may adversely affect EFH for chinook or coho salmon.

II. PROPOSED ACTION

The stewardship project consists of multiple activities throughout the Meadow Creek, Wickiup Creek, and Ralph Smith Creek watersheds in the NPNF, including timber harvest, changes to the road system, prescribed burning, reduction of exotic vegetation and noxious weeds[1], and watershed restoration. A detailed map of the project is provided in the BA. Proposed activities would occur over a 10-year period, and be conducted by U.S. Forest Service (USFS) personnel or contractors. The NPNF will award a multi-year stewardship contract to the contractor whose proposal best meets end-results described in the solicitation for bids. The objectives of the stewardship project are to reduce the potential occurrence of uncontrollable or high intensity wildfires, modify vegetative conditions to achieve certain silvicultural or ecological goals, and to rehabilitate watershed functions by restoring areas occupied by roads, skid trails, and yarding areas. The Final Environmental Impact Statement (FEIS) for the Meadow Face Stewardship Pilot Project describes monitoring and reporting requirements, and design and implementation criteria to avoid or minimize potential adverse impacts on listed species. The proposed activities are described in detail in the October 30, 2001, BA and in the FEIS[2]. The major activities include:

- Maintain 103 miles of road including 8.5 miles of deferred maintenance
- Construct 12.25 miles of temporary road
- Decommission 90 miles of road
- Convert 4.5 miles of road to trail
- Maintain dispersed campsites where roads are decommissioned
- Harvest timber on 3735 acres utilizing mostly thinning prescriptions (producing approximately 15 million board feet of timber)
- Prescribed burns on 7100 acres
- Control of noxious weeds (not included in this consultation; see footnote 1
- Restore native plant species in McComas Meadows

---

[1] Effects of noxious weed control activities are not evaluated in this Opinion, but will be evaluated prior to implementation, under a forest-wide consultation on weed control.

[2] The proposed action has been adjusted since the final BA. The effects analysis in this Opinion reflects the effects of the adjusted action.

- Restore 550 acres of compacted soils
- Stabilize the Meadow Creek Slide
- Install improvements at three recreation sites (Camp 58, McComas Junction, and Quartz Ridge)
- Construct approximately 0.1 mile of new off-highway vehicle (OHV) trail
- Replace approximately 45 culverts
- Restore approximately 3 miles of stream (Whitman, False and Swan Creeks)
- Rehabilitate irrigation ditch surrounding McComas Meadow

Key elements of these activities will be described in the effects analysis discussion. (section C., below)

III. ENDANGERED SPECIES ACT

A. Status of the Species

The NPNF has determined that listed Snake River steelhead occur in the area affected by the proposed action. The Snake River steelhead Evolutionarily Significant Unit (ESU) was listed as threatened on August 18, 1997 (62 FR 43937), and protective regulations for Snake River steelhead were issued under section 4(d) of the ESA on July 10, 2000, (65 FR 42422). In listing the Snake River steelhead as threatened, NOAA Fisheries determined that the ESU is not presently in danger of extinction, but is likely to become endangered in the foreseeable future. This is due largely to the declining abundance of natural runs over the past decades. Some of the significant factors in the declining populations are mortality associated with the many dams along the Columbia and Snake Rivers, losses from harvest, loss of access to more than 50% of their historic range, and degradation of habitat used for spawning and rearing. Possible genetic introgression from hatchery stocks is another threat to Snake River steelhead since wild fish comprise a small proportion of the population. Additional information on the biology, status, and habitat requirements for Snake River steelhead are described in Busby et al. (1996).

Streams in the Meadow Creek watershed provide habitat for adult spawning, juvenile rearing, overwintering, and migration (USDA 1999a). The Meadow Creek watershed is designated a Priority Watershed on Federal lands. Under PACFISH[3], priority watersheds are intended to protect important habitats and population strongholds of anadromous fish, and are managed to maintain or improve fish habitat (Prichard et al. 1998; USDA 1999a).

The 2000 and 2001 counts of returning Snake River steelhead at Lower Granite Dam indicate a short-term increase in returning adult spawners. Adult returns (hatchery and wild) in 2001 were the highest in 25 years and 2000 counts were the sixth highest on record (Fish Passage Center 2001a). Increased levels of adult returns are likely a result of favorable ocean and instream flow

[3] Implementation of Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and California

conditions for these cohorts. Although steelhead numbers have dramatically increased, wild steelhead comprise only 10% to 20% of the total returns since 1994. The large increase in fish numbers, while encouraging, does not reflect a sustained change in steelhead status. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline.

Survival of downstream migrants in 2001 was the lowest level since 1993. Low survival was due to record low run-off volume, and elimination of spills from the Snake River dams to meet hydropower demands (Fish Passage Center 2001b). The average downstream travel time for steelhead nearly doubled and was among the highest observed since recording began in 1996. Consequently, wide fluctuations in population numbers are expected over the next few years when adults from recent cohorts return to spawning areas.

Two distinct groups of steelhead (A-run and B-run) occur in the Snake River basin, based on the timing of passage over Bonneville Dam (Busby et al.1996). Steelhead in the project area are believed to be mostly B-run steelhead of hatchery-origin. A-run steelhead pass Bonneville Dam before August 25, and are widely distributed in the Snake River basin. A-run steelhead occupy lower portions of the Clearwater drainage, including the Middle Fork Clearwater and Lower South Fork Clearwater Rivers and tributaries (Kiefer et al.1992). B-run steelhead pass Bonneville Dam after August 25, and occur primarily in the Clearwater drainage, particularly in upper portions of the drainage, such as the Lochsa, Selway, and upper South Fork Clearwater Rivers (Kiefer et al. 1992). B-run steelhead were extirpated from the North Fork Clearwater River by construction of the Dworshak Dam.

Steelhead numbers in the South Fork Clearwater River drainage, including the project area, are dramatically reduced from historic levels due to extensive alteration of fish habitat from past logging, roads, diversions, grazing, and downstream migration and rearing impacts common to all Columbia River salmon and steelhead. Habitat conditions have improved in recent years due to removal of cattle from McComas Meadows and other restoration efforts in the drainage. Gradual improvements in habitat conditions are expected to continue in McComas Meadows and surrounding areas where restoration activities have occurred.

The Snake River fall chinook salmon ESU, listed as threatened on April 22, 1992 (67 FR 14653), includes all natural-origin populations of fall chinook in the mainstem Snake River and several tributaries including the Tucannon, Grande Ronde River, Salmon River, and Clearwater River. Fall chinook are not present in the action area, however, fall chinook salmon redds have been reported by Garcia (2000) in the lower 5 miles of the South Fork Clearwater River. The fall chinook salmon redds reported by Garcia (2000) are the uppermost occurrence in recent times, but are more than 25 miles downstream from the proposed action. Based on the distance of these redds from the action area, and the long-term reduction in sediment from the proposed action, the

NPNF determined that the proposed action is "not likely to adversely affect" fall chinook salmon. NOAA Fisheries concurs with this determination, therefore, effects of the proposed action on Snake River fall chinook salmon will not be evaluated further in this Opinion.

B. Evaluating Proposed Actions

The standards for determining jeopardy and adverse modification or destruction of critical habitat are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). NOAA Fisheries discusses the analysis necessary for application of these standards in the particular contexts of the listed species in "The Habitat Approach" (NMFS 1999). The jeopardy analysis involves the following steps: (1) define the biological requirements of the listed species; (2) evaluate the relevance of the environmental baseline to the species' current status; (3) determine the effects of the proposed or continuing action on listed species; and (4) determine if the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the environmental baseline and any cumulative effects, and considering measures for survival and recovery specific to other life stages. If NOAA Fisheries finds that the action is likely to jeopardize the continued existence of the listed species, NOAA Fisheries must identify reasonable and prudent alternatives for the proposed action.

1. Biological Requirements

The first step in the method NOAA Fisheries uses for applying the ESA standards of section 7 (a)(2) to listed salmon and steelhead is to define the species' biological requirements that are most relevant to the particular consultation. The biological requirements are defined in this Opinion as the habitat components necessary to support successful adult and juvenile migration, spawning, and rearing. Those necessary habitat characteristics include an appropriate range of channel substrate sizes, and adequate water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (Busby et al. 1996; Spence et al. 1996; 62 FR 43937, August 18, 1997; 65 FR 7764, February 16, 2000). Spawning and egg incubation require clean gravels and an ample supply of cool, well-oxygenated water. Juvenile rearing requires a complex physical environment with ample pools, shade, cover, and food production. Successful juvenile and adult migration require ample stream flow and velocity, in-channel cover, low water temperatures, and unobstructed passage.

Important habitat components related to survival and recovery of listed anadromous fish are included as habitat "indicators" in "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (NMFS 1996 - hereafter referred to as "NMFS matrix"). The NPNF used the NMFS matrix to evaluate the baseline condition, and effects of the action on habitat for Snake River steelhead.

In the project area, steelhead are found in Swede Creek, Rock Creek, Covert Creek, North Meadow Creek, Whitman Creek, Storm Creek, and the mainstem of Meadow Creek. Steelhead spawning also occurs in the South Fork Clearwater River both above and below the mouth of the Meadow Creek. Adults migrating to the Clearwater River generally enter fresh water in late summer and fall, overwinter in the mainstem Clearwater river and move into the South Fork and tributaries in early spring. Adult steelhead spawn during April in the steeper, smaller streams such as Meadow Creek. Juveniles generally spend about 2 years (sometimes three) in natal streams and rivers, before moving downstream to the ocean during the spring runoff period in April or May. Adults remain in the ocean for 1 to 3 years before returning to fresh water.

2. Environmental Baseline

To determine the effects of the proposed action, NOAA Fisheries first examines the environmental baseline, which consists of existing conditions and anticipated conditions from effects of activities that have undergone previous section 7 consultation. Of particular importance are instream and riparian elements that provide key habitat components for listed steelhead and could be affected by the action. NOAA Fisheries focuses primarily on the existing conditions in Meadow Creek and its tributaries streams where the proposed activities would likely have their greatest effect, and from which effects could be translated downstream. The BA summarized the environmental baseline and effects within Meadow Creek, and in Covert Creek, which is a tributary to Meadow Creek. As noted above, NPNF used NMFS matrix (NMFS 1996; with local revisions for NPNF and adjacent management units, March 12, 1998) to describe baseline conditions and estimate effects of the action at the watershed scale on steelhead habitat.

The action area consists of all areas directly or indirectly affected by the proposed action (50 CFR 402.02), including areas either upstream or downstream where effects may occur. Direct effects of the project occur at the sites where activities are proposed, and may extend upstream depending on the potential for altering fish passage, water temperature, watershed hydrology, channel morphology, sediment, and the extent of riparian modifications. Indirect effects may occur throughout the affected watersheds, where actions described in this Opinion lead to additional interrelated/interdependent activities, or where direct effects alter biological or physical processes that result in future environmental changes.

The action area for the project includes the entire Wickiup Creek, Ralph Smith Creek, and Meadow Creek drainages and three unnamed tributary watersheds between the mouth of Meadow Creek and Wickiup Creek. The action area also includes several miles of the South Fork Clearwater River from the mouth of Ralph Smith Creek downstream to Cove Creek, where changes in sediment or water yield from the project may have an effect on steelhead habitat in the South Fork Clearwater River. The action area is almost entirely Federal land, except for a large block of private land near the mouth of Meadow Creek, and another block of land several miles downstream of the confluence with Meadow Creek and the South Fork Clearwater River. Environmental baseline conditions in the action area were evaluated in the BA at the project site and watershed scales, using the “matrix of pathways and indicators” described in NMFS (1996). The matrix assesses the current condition of instream, riparian, and watershed factors that collectively represent habitat processes and conditions essential for the survival and recovery of the species.

Stock status for Snake River steelhead is discussed in Attachment A. In short, the abundance of natural-origin Snake River steelhead counted at the uppermost dam on the Snake River has declined from a 4-year average of 58,300 in 1964 to a 4-year average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and declined again during the 1990s. Estimates of adult steelhead returning to the action area are not available. Redd counts and estimates of parr and smolt densities at index areas (discussed in Attachment A) generally indicate that fish production is well-below the potential, and continuing to decline.

NOAA Fisheries estimates that the median population growth rate (lambda) for the Snake River steelhead ESU as a whole, from 1980-1997, ranges from 0.91, assuming no reproduction by hatchery fish in the wild, to 0.70, assuming that hatchery fish reproduce in the river at the same rate as wild fish (Tables B-2a and B-2b in McClure et al. 2000). The proportion of hatchery fish in the Snake River steelhead population has been increasing with time; consequently, growth rates for the wild steelhead population are overestimated unless corrected for hatchery influence. The degree of hatchery influence is unknown. NOAA Fisheries estimated the risk of absolute extinction for the A- and B-runs, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (Table B-5 in McClure et al. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs (Table B-6 in McClure et al. 2000).

Detailed information on the current range-wide status of Snake River steelhead, under the environmental baseline, is described in a steelhead status review (Busby et al. 1996), status review update (BRT 1997), and the draft Clearwater Subbasin Summary (CBFWA 2001).

The Snake River steelhead ESU consists of hatchery fish, considered non-essential for recovery, and wild fish, which form the core population for recovery. Range-wide, wild Snake River steelhead are far below historical numbers, and they comprise less than 20% of the adult returns. Much of the historic habitat is inaccessible due to Hell’s Canyon and Dworshak Dams. The biological requirements of Snake River steelhead are currently not being met under the environmental baseline, as indicated by mostly downward trends in numbers of wild adults. Any changes in the environmental baseline in an area as large as the Meadow Creek drainage could have a significant impact on steelhead recovery due to the importance of the drainage for potential steelhead production, and the heightened risk from a declining population trend across the ESU.

The returning numbers of Snake River steelhead have increased since the mid-1970s, however, this increase is mostly the result of hatchery stocks, while wild stocks have continued a downward trend. Wild fish populations began declining in the mid-1970s and continued through 1998, and then increased from 1999 through 2001 (Fish Passage Center 2001a). Current wild populations even with recent increases are still substantially below historic levels, and parr densities in natural production areas are estimated to be below estimated capacity (Hall-Griswold and Petrosky 1996). The downward trends and low parr densities are particularly severe for B-run steelhead, which are the dominant form in the South Fork Clearwater River drainage.

Natural steelhead populations in the South Fork Clearwater drainage were virtually eliminated by dams constructed in the mainstem Clearwater River at Lewiston in 1927, and in the South Fork Clearwater River at Harpster in 1910 (Cramer et al. 1998). The Lewiston Dam virtually eliminated chinook salmon in the Clearwater River basin, but a limited number of steelhead were able to pass over a fish ladder (Nez Perce Tribe and IDFG 1990). The Lewiston Dam was removed in 1973. The Harpster Dam was a complete migration barrier for all fish species between 1910 and 1935. A wooden fishway was constructed at the Harpster Dam in 1935, but the structure provided only marginal passage (Cramer et al. 1998). The fishway washed out in 1949, and the Harpster Dam remained impassable until it was removed in 1963. Consequently, steelhead present in the South Fork today are primarily of hatchery lineages.

Hatchery stocks of B-run steelhead indigenous to the Clearwater River were used to re-build populations in the drainage beginning in 1961 (Nez Perce Tribe and IDFG 1990), and continue to be used to enhance steelhead runs. Prior to 1969, hatchery stocks were obtained from fish trapped at the Lewiston Dam, and after 1969, all subsequent supplementation in the Clearwater subbasin originated from the Dworshak Hatchery (Nez Perce Tribe and IDFG 1990). B-run steelhead have been planted in the South Fork Clearwater River since 1962, and Meadow Creek has been used periodically as an incubation channel for steelhead eggs since 1978. Presently, the steelhead population in the action area is believed to be substantially below historic numbers, but near the highest levels since the Lewiston and Harpster Dams were removed. Steelhead densities in the action area are considered to be below potential carrying capacities (Hall-Griswold and Petrosky, 1996).

In the action area, steelhead are present in portions of Meadow Creek, as well as several tributary streams which include: Covert Creek, Rock Creek, Swede Creek, North Meadow Creek, Whitman Creek, and Storm Creek. Steelhead spawning is known to occur in Whitman, North Meadow, and mainstem Meadow Creeks, with the majority of spawning areas in Meadow and North Meadow Creeks. All of the perennial streams in the area could be potentially used for juvenile rearing, particularly in lower stream reaches near the confluence with Meadow Creek Steelhead distribution in the action area, prior to European developments in the late 1800s, is likely to have been more extensive.

Steelhead habitat conditions in the action area vary from high to low quality, depending largely on the severity of past disturbances from irrigation ditches, grazing, logging, and road building. Road densities in the project area watersheds range from 1.4 to 5.5 miles per square mile, with only Covert Creek having less than 2 miles of road per square mile. Two miles of road per square mile is an approximate indicator threshold between properly functioning and "at risk" stream conditions (NMFS 1996). A high percentage of the roads in the project area are located in riparian habitat conservation areas (RHCAs). A portion of the action area was private timber land that was tractor-logged in past decades, and some streams still exhibit impacts created in the 1940s and 1950s from compaction of soils and use of stream channels and riparian areas as skid trails. Some streams were moved or diverted for irrigation and channels were filled in with dirt and debris to create flat areas for use as landings, logging camps, storage areas, or other facilities related to timber harvest. Stream channels in portions of Swede Creek, Whitman Creek, North Meadow Creek are severely degraded from past activities, and present-day cattle trailing through streams and riparian areas is possibly inhibiting or precluding recovery of some of the channels.

Numerous restoration activities have been undertaken in the past decade, including exclusion of cattle from McComas Meadow in upper Meadow Creek, replacement of impassable culverts with passable structures, closure or rehabilitation of roads and skid trails, and restoration of natural drainage features that were altered by ditches or relocation of streams. Fish habitat conditions have generally improved where watershed restoration has occurred. However, ongoing grazing, timber harvest, and road building that occurred contemporaneously with restoration efforts slowed or possibly offset the recovery of fish habitat in portions of the action area.

The lower portions of Meadow Creek were historically logged extensively, roughly 26% of the area being tractor logged. There are approximately 39 miles of road within this watershed and 5.7 miles are located within the streamside zone. Within this portion of the watershed there are 43 stream road crossings, which increases the level of road-stream connectivity and provides sediment sources directly to the stream. The BA provides additional details on riparian and stream channel conditions in each of the action area watersheds.

C. Effects of the Proposed Action on Snake River Steelhead

The NPNF used the NMFS matrix (NMFS 1996) to evaluate baseline conditions, and to determine effects of the actions on habitat features for Snake River steelhead. Results of the completed matrix for the actions provides a starting point for determining the overall effects of the actions on the environmental baseline within the action area. This process is fully described in NMFS (1996). The effects of the action are expressed in terms of the expected effect (restore, maintain, degrade) on each of 16 habitat factors in the action area, as described in the "checklist for documenting environmental baseline and effects of the action" completed for each action and watershed.

1. Activity-specific effects on Snake River Steelhead

a. Road Maintenance

Road maintenance has both short-term and long-term effects. Planned activities such as excavation, ditching, reshaping, drain-clearing, and grading result in disturbances that typically create short-term increases in sediment delivery that taper off after disturbed areas become compacted or after several runoff events occur. Beneficial effects of maintenance typically persist for one or more seasons, depending on a variety of factors such as: amount of traffic, precipitation, and physical properties of the road surface. Benefits of proper maintenance include minimization of erosion or sediment delivery from ditches and road surfaces, however, improper maintenance can exacerbate erosion or sediment delivery to streams. Road maintenance also includes removal of roadside vegetation that can impair stream functions by decreasing shade and reducing recruitment of woody debris along streamside roads. The proposed road maintenance is covered under a previously consulted programmatic consultation (USDA 1999). Therefore, road maintenance is part of the baseline and little or no change is expected to occur, except where road maintenance effects are reduced or eliminated from roads that are decommissioned or converted to trails. This would then result in an overall reduction in the effects of this action.

Under current programmatic operations several mitigative measures have been incorporated to reduce the effects of the program: (1) Brushing operations are to consider the need for stream shading, (2) sidecasting will not occur where materials may be introduced into the stream, and (3) cleaned materials from culverts and open tops will not be flushed or deposited in stream courses. A more detailed description of the current mitigation measures in place are available in the *South Fork Clearwater Biological Assessment* (USDA 1999c).

b. Temporary Road Construction and Road Reconstruction

Temporary road construction and road reconstruction are expected to produce a spike in sedimentation, followed by decreasing sedimentation that approaches natural levels 3 to 5 years after project completion, similar to patterns observed with new road construction. The BA indicates sediment created by temporary road construction and road reconstruction (along with other sediment-producing activities) will degrade fish habitat for several years following the activities.

To reduce the effects of these activities the NPNF plans to incorporate several mitigation measures including: (1) construct roads to minimum standard to accommodate vehicle types, and season of use, (2) establish vegetation on cut slopes and road fill on roads held more than one season, (3) locate roads to avoid live water and landslide prone areas, and (4) provide slash filter windrows where they would benefit nearby aquatic resources.

c. Road Decommissioning and Trail Conversion

Road decommissioning and trail conversion are expected to create a temporary increase in stream sediment produced from partial or complete removal of the road prism, followed by a permanent reduction in erosion of the road surface that typically approaches near-natural levels. Trail conversions vary in their effectiveness, depending on the levels of use and maintenance. Roads converted to trails will remain a perpetual source of sediment over natural levels, but the actual amount of sediment contributed may be reduced, depending upon the type of trails use. The decommissioning will reduce the road miles in landslide-prone areas will farther reduce the risk of landslides and sediment delivery over the long term, especially along the North Fork and Whitman Creek. This will contribute to improved fish habitat once initial sediment increases have subsided. To reduce the initial sediment increases, mitigation measures have been proposed by the NPNF, including: (1) providing reconstructed valley bottoms and channel configurations that approximate natural conditions at stream crossings, (2) employ seasonal controls and contract requirements regarding operating conditions to minimize potential for sediment production from the decommissioning activities, (3) conduct activities occurring in fish-bearing streams with live water between July 1, and August 15, and (4) employ measures to control erosion and sedimentation at stream crossings.

d. Dispersed Campsites

The effects of dispersed campsite improvements occur primarily through continuation of, or changes in, human recreational use. Existing dispersed camp sites in riparian areas (North Meadow, Camp 58, and “Brush Camp”) encourage access to areas where steelhead spawn or rear, creating an increased likelihood of harm or harassment of steelhead, compared to an area that is not used for camping. Continued human use in these areas may result in the removal of riparian trees for firewood, soil compaction, clearing of brush and other vegetation, and introduction of chemical contaminants (such as soap or detergent) into the water. Campsite improvements are expected to reduce erosion, and eliminate human waste at Camp 58. The level of use is not expected to change as a result of the improvements.

e. Stream Channel Restoration

Stream channels in the McComas Meadows area are expected to function more naturally as a result of reshaping, stabilizing, and re-vegetating an existing irrigation ditch. The effects of this action on steelhead habitat include a short-term increase in the sediment input to Whitman Creek and other streams in the project area, followed by a long-term reduction in the sediment input and increased stabilization of banks. Several reaches of False Creek, Whitman Creek, and Swan Creek degraded by overgrazing and historic timber production will be stabilized. The methodologies utilized would include adding large woody debris (LWD) or large rocks and boulders to be placed by hand or machinery. The spacing of these structures would be designed to replicate the conditions in similar stable drainages. Some channel re-alignment may be needed along with valley bottom modifications adjusting the slopes to the new channels. The effects of this action on steelhead and steelhead habitat include eventual increases in LWD which will increase the quality and quantity of pools within these drainages. Bank stabilization will decrease sediment inputs and allow for additional riparian vegetation establishment to re-establish more natural channel and bank morphology.

f. Timber Harvest

Timber harvest activities potentially affect fish habitat through alteration of watershed hydrology, changes in temperature, sunlight, riparian vegetation, nutrients, and increased sediment from roads, skid trails, and landings (Spence et al. 1996). The timber harvests planned in the Meadows Face drainage are expected to have minimal influences on most of these factors because harvests will not occur in PACFISH RHCAs, the majority of harvest units are accessible from existing roads, and the amount of harvest is limited to levels that are not expected to cause increases in water yield that exceed the natural channel capacity. Equivalent Clearcut Area (ECA) increases for the proposed actions, including timber harvests, are not expected to increase above the 15% guidelines for priority watersheds. The ECA was calculated by prescription watersheds and by sub-watersheds. These calculations take into account the effects of harvest and temporary road construction, but omit the effects of prescribed fire, analyzed in a later section, due to the low intensity of proposed actions. The ECA increases range from one to five percent with the largest in Covert Creek. Covert Creek includes about 34% of the watershed being affected by tractor logging and dozer piling. Given the past and proposed activities and the inventoried condition of Covert Creek, the harvest proposed may pose some risk for channel instability. The cumulative effects of having proposed prescribed burn units within this watershed also add to the risk of increased water yield and peak flows in headwater stream. Covert Creek was classified as a B4 channel under the Rosgen classification system (USDA 1999d). This channel type is characteristically resilient and resistant to change.

The ECA in Orchard Creek will also increase similarly to that of Covert Creek with a 4.66% increase. However, this watershed was classified as a E6 channel under the Rosgen classification system (USDA 1999d), which is not characteristically resilient or resistant to changes. Proposed harvests on landslide prone areas create a risk of causing or exacerbating a mass failure. Mitigation is expected to minimize, but not eliminate this risk.

g. Noxious Weed Control and Native Plant Restoration

The effects of noxious weed control activities proposed in the Meadow Face project will be evaluated under a separate Forest-wide consultation on weed control and is not included in this consultation.

h. Prescribed Burns

The effects of prescribed burning were evaluated in the Programmatic Biological Assessment of Fire Management Activities (USDA 1999b), and additional site-specific effects were provided in the Meadow Face BA. The BA cited results from USDA (1999a) that concluded that recent prescribed fires have been of such low severity that erosion and landslide risk have not been significantly affected. Prescribed fire has previously occurred in streamside riparian areas under controlled conditions, and subsequent monitoring suggests that PACFISH Riparian Management Objectives (RMOs) have not been affected. The effects of the Meadow Face prescribed burns are expected to be similar to those in USDA (1999a), since the proposed burning will follow the same guidelines, and occur in the same general area where previous fires have occurred. The sediment modeling in the BA includes fire-related sediment (sediment effects are discussed below in section C.2.a). Prescribed fire effects are likely to create a short-term increase in the risk of mass soil movement in landslide-prone areas, and possibly create a more persistent risk of mass soil movement if fires burn more intensely or extensively than prescribed. The BA reported that historical burning on the South Fork Face by the Nez Perce Forest has had almost no effect on long-term slope stability. Increases in stream temperature are possible if prescribed burning results in significant amounts of overstory mortality in streamside RHCAs, however significant temperature effects are not anticipated to occur due to design criteria that restrict actions likely to result in stream temperature increases.

i. Soil Rehabilitation

Soil restoration treatments will include decompacting of old skidtrails and roads, and restoration of stream channels by removing soils, reshaping channels, and repair of headcutting and gullies. Mitigation for these activities will include placing slash and large wood in draws, and mulching and revegetation of decompacted areas with grasses, shrubs and trees. The soil treatments will improve water infiltration, aeration, and the environment for tree and shrub root growth. Treatments will also have long term benefits such as: (1) decreased water yield; (2) decreased compaction; and (3) reduced channel erosion and instability.

j. Meadow Creek Slide Stabilization

Stabilization of this site involves constructing a surface ditch to divert water from the face of the slide. This will lower the water level in three ponds which have formed at the top of the slide. The NPNF has proposed mitigation measures which are designed to reduce the amount of sediment that this project would deliver to the stream including: conducting work in normal dry season, constructing relief ditch with sloping side-walls, and placing excavated material above the normal high water level. The effects on steelhead habitat include: (1) a temporary increases in sediment from an exposed surface ditch; (2) a reduction of the overall sediment input of the slide to Meadow Creek; and (3) a reduced risk of mass failure.

k. Re-construction of Off-Road Vehicle Trails

Effects from reconstruction of off-road vehicle trails includes bank disturbance at crossings, increased sediment during construction, changes in channel morphology, loss of riparian vegetation, increased chemical contaminants (mostly oil and gas) from motorized vehicles, improved access which may result in trampling of redds, and increase harassment or take of individual fish through increased fishing. These impacts would create an increase in sediment immediately followed by a stabilization and reduced input of sediment associated with the trail surface.

l. Culvert Replacements

Culvert replacements require instream work that involves temporary diversion of water, followed by removal of existing culverts, installation of new culverts, possible addition of instream structures above and below, and finally, removal of the temporary diversions. Excavation of road fills and stream channel materials, and placement of instream structures are likely to temporarily increase stream turbidity and rearrange substrate materials. The temporary increase in stream turbidity could temporarily diminish feeding; however, this effect is thought to be negligible since the duration and extent of turbid flows are likely to be short-lived and localized.

There is also the possibility that instream work activities could kill juvenile steelhead. However, direct mortality is unlikely because juvenile fish are capable of avoiding construction equipment by moving away from the project work sites, and the temporary diversions allow fish to use the stream without coming into contact with equipment. Some mortality could occur from fish becoming stranded in temporarily dewatered channels, or handling fish to remove them from the project area. All work would occur between July 1, and August 15 to avoid disruption of steelhead and chinook redds, and adult chinook migrations. This work window does not avoid potential effects on juvenile steelhead that may be in the vicinity of culverts while instream work is conducted. The work window above may be adjusted on a site by site basis with Level 1 approval.

Culvert replacements are expected to have long-term beneficial effects on streams in the action area. Hydrologic function will be increased by reducing the probability of culvert failures and by re-establishing more natural patterns of bedload movement. This will accommodate the natural migration patterns of micro-invertebrates. Fish passage will be improved by providing passage conditions in the culverts that approximate natural conditions above and below the culvert.

m. Interrelated and Interdependent Actions

Effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, or interdependent with, that action. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. Interdependent are activities that have no independent utility apart from the action under consultation (50 CFR § 402.02). There are no interrelated or interdependent actions likely to occur as a result of the Meadow Face project.

2. Integrated Watershed-Scale Effects

a. Sediment Yield/Deposited Sediment

Increased sediment yields predicted in the Meadow Face BA are expected to increase the amount of fine sediment in stream channels. Sediment can affect salmonid species in a number of ways, and the effects are complicated by the variability and adaptability of salmonids to ambient sediment levels (Everest et al. 1987). Fine sediment in spawning gravel can reduce interstitial water flow, leading to depressed dissolved oxygen concentrations, and can physically trap emerging fry in the gravel (Koski 1966; Everest et al. 1987; and Meehan and Swanston 1977). Fish eggs deposited in gravels with a high percentage of fine sediments have a reduced rate of survival. Egg survival and fish abundance decrease rapidly when fine sediment exceeds a threshold of approximately 30% fines by volume (Everest et al. 1987; Spence et al. 1996). Fine sediment in deposits or in suspension can reduce primary production and invertebrate abundance, thus affecting the availability of food within the stream (Hicks et al. 1991). Suspended sediments may also alter the behavior and feeding efficiency of salmonids. Differing concentrations of suspended sediment may cause salmonids to avoid certain areas, cease feeding, and/or alter their social behavior (Hicks et al. 1991).

The anticipated increase of sediment for prescribed burns was modeled using the NPNF sediment model (USDA 1981). The model includes timber harvest, prescribed fire, road decommissioning, temporary road construction, and road reconstruction. Effects were modeled for a 12-year period beginning in year 2001 with most activities occurring in the years 2003 and 2004, but the actual implementation would occur over a period of up to 10 years. This results in a modeled spike in sediment. Meadow Creek composite watershed had the greatest temporary increase in sediment delivery. The existing sediment prior to the proposed action is 17.9% over base and would peak at 24.4% over base in year 2003 and then taper off to 10.6% over base by year 2012. This is a 7.3% net decrease. The NPNF plan maximum sediment yield guideline objective allows for 35% to 70% over baseline for 1 to 3 years per decade in these prescription watersheds, (USDA 1987). The sediment results were used to calculate potential increases in cobble embeddedness and the corresponding decreases in summer and winter rearing capacity by using the mathematical fish/sediment relationship model (FISHSED; Stowell et al.1983).

Sediment effects on fish habitat were modeled with FISHSED, as if all activities occurred at once, in the first year of the project. The model predicted a seven percent increase in cobble embeddedness, with corresponding decreases of five and seven percent in summer and winter rearing capacity, respectively. The reduced habitat capacities are predicted to persist for 3 to 4 years. Actual sediment increases would likely be distributed over the life of the project, since sediment-producing activities would not all occur in the same year. Consequently, the magnitude of the sediment increase would be less than the model predictions, but would persist for a longer period of time. Riverine ecosystems appear to be well-adapted to pulses of sediment, but are adversely affected by chronic sediment, which does not occur naturally (*e.g.* Benda et al. 1998; and Yount and Niemi 1990).

The proposed actions would temporarily increase the amount of sediment during, and for a few years, after ground-disturbing activities. The mitigation measures noted in the BA and mentioned above under activity specific effects assist in minimizing sediment delivery. In the long term, the proposed actions are expected to decrease the amount of sediment, compared to modeled baseline levels within the watersheds, and fish habitat conditions are expected to improve over time. Long-term improvement in watershed condition and baseline sediment yield will result from road decommissioning, soil rehabilitation, slide stabilization, and other activities that reduce sediment or water yield. Proposed vegetative treatments would also lower the risk of uncharacteristically hot or extensive wildfires and thus can decrease the risk of sediment delivery associated with wildfires.

b. Water Quality, Including Toxicants and Stream Temperature

Water quality in the project area could be affected by introduction of toxic materials to streams and increases in stream temperature from reduction in shade to streams. Introduction of toxic materials could result in a direct adverse effects on aquatic resources. Toxic materials used in the proposed action include herbicides and fossil fuel derivatives, including Jet-A fuel, diesel fuel, hydraulic fuel, various petroleum-based lubricants, and gasoline. Surfactants and other fire retardant chemicals could be used if a prescribed burn escaped, requiring suppression actions. This risk of adverse effects from chemical contamination is low, given constraints on prescribed burning and fire suppression (USDA 1999b), and mitigation for fuel hauling and fuel spills.

Given that summer stream temperatures in much of the Meadow Face area are already substantially higher than objectives described in PACFISH and the matrix, further increases in stream temperature would adversely affect steelhead habitat. Increases in stream temperature would be possible if riparian management activities result in significant overstory losses in streamside RHCAs. Since harvest of timber within streamside RHCAs is not proposed, and fire management criteria (USDA 1999b) minimizes the risk of riparian overstory mortality, the risk of adverse effects from increased stream temperature is minimal. Additionally, riparian vegetation would be restored on decommissioned roads and at stream crossings, which should contribute to more moderate stream temperatures, and possibly decrease stream temperature in the long term.

c. Habitat Connectivity/Passage

The installation of higher capacity culverts is expected to improve fish passage functions over the environmental baseline conditions in the action area. Benefits associated with improved fish passage conditions include increased access to juvenile rearing habitats, and increased foraging opportunities.

d. Riparian Vegetation and Streambank Stability

Minor amounts of riparian vegetation would be removed where roads or trails are reconstructed or decommissioned at stream crossings, and where culverts are be replaced. Riparian vegetation provides shade, filters sediment, aids in floodplain development, protects streambanks, and dissipates stream energies associated with high flow events (Spence et al. 1996). Removal of vegetation may result in increased water temperatures, and localized losses of the riparian functions described above. However, due to the limited amount of vegetation removal around construction areas, these effects are expected to be minimal and localized, and eventually offset through replanting lost vegetation, and restoration of vegetation elsewhere in the drainage.

Heavy cattle grazing in riparian areas is a major cause of stream bank instability and higher cobble embeddedness in the Meadow Face drainage. Riparian corridors in the watershed provide cattle access to water, and are used as resting areas and trails between forage sites. Grazing has resulted in dish shaped and incised channels, heavy bank trampling, degraded riparian vegetation, elevated deposition of fine sediment in stream channels, increased water yield, and surface erosion in areas accessible by cattle. Grazing in the Meadow Face watershed will likely continue concurrently with the stewardship project.

Successful restoration of the RHCAs and streams in the Meadow Face area is dependent upon protecting restored areas from cattle damage. Grazing is not part of the proposed action, but grazing in the action area has previously undergone consultation and is therefore part of the environmental baseline. The existing level of cattle use in the Meadow Face drainage has the potential to thwart planned restoration activities if changes in cattle use are not integrated with road decommissioning, soil rehabilitation, and other stream and riparian restoration activities. Changes in the allotment management would occur as part of the Annual Operating Instructions for the Meadow Lightning Allotment, and the Meadow Face FEIS (p. 2-37) includes specific guidance and design criteria including: fencing, herding, and changes in timing.

e. Changes in Fluvial Transport and Channel Morphology

The installation of higher capacity and bottomless culverts, and a reduction in the number of stream crossings would improve natural hydrologic functions. This would contribute to improved habitat quality by transporting of trapped sediments and organic debris to downstream reaches. The higher capacity culverts would also reduce the probability of catastrophic damage to aquatic habitats from plugged culverts and subsequent erosion of road fills.

f. Population Effects

The proposed action does not have direct population effects, but the action may indirectly affect populations through long-term changes in habitat features, as noted above. Steelhead populations are unlikely to exhibit a measurable response to the short-term adverse effects of the project (such as increased sediment or localized reductions in riparian vegetation) since the adverse effects would be localized, and dispersed over 10 years and across the project area. However, improved fish passage will provide an immediate increase in the amount of accessible habitat. In the long-term (a decade or more), the availability of spawning habitat and the carrying capacity for juvenile steelhead could increase as a combined result of improved fish passage, reductions in sediment, and improved riparian conditions. Those expected long-term improvements in both quantity and quality of steelhead habitat within the action area may also increase steelhead survival and population growth rate (lambda). The extent of population response to the habitat improvements is not known, but would depend on which habitat components are improved (e.g. substrate interstitial space) and how much those components are limiting survival/growth rates.

g. Potential Deviations from Predicted Effects

The stewardship project includes watershed restoration activities that would likely contribute to the survival and recovery of steelhead, after short-term impacts from road obliteration and other ground disturbing activities taper off, and watershed function begins to improve. The project also includes road construction and timber harvest activities that are expected to have adverse habitat effects, while contributing little to improved survival or recovery of steelhead. Based on predicted effects of the proposed action in the Meadow Face BA, restoration activities are expected to eventually more than offset any new sediment created from timber harvest, prescribed fire, and road work. Hydrologic conditions are expected to generally improve. However, because of possible budget constraints, it is possible that planned timber harvests, prescribed burns, road construction, and road re-construction could be fully implemented, while only a portion of the restoration activities occur because sufficient funds are not available. If restoration does not occur as planned, the anticipated level of benefits from the restoration activities would not be realized.

Because the action includes a mix of activities with either beneficial or adverse effects, the timing of the various activities will also determine the severity and duration of short-term adverse effects. Short-term increases in sediment from the ground disturbing activities are likely to reach streams almost immediately, while transport of the additional sediment out of the action area requires a much longer period of time - possibly decades (Platts et al. 1989). Sediment levels in the project area stream channels are presently high, and future sediment inputs, after restoration is completed, will remain five percent to 15% over estimated natural levels. If prescribed burns, road construction and re-construction activities occur prior to watershed restoration activities, then net benefits from the stewardship project will be delayed.

3. Cumulative Effects

The cumulative effects for fisheries resources include the effects of future state, tribal, or private actions that are reasonably certain to occur in the action area. Virtually all of the Meadow Face action area is Federal land managed by the NPNF, therefore, most future actions in the action area will be subject to section 7 consultation. There are no known future state, tribal, or private actions that are reasonably certain to occur in the action area.

D. Conclusion

NOAA Fisheries has determined that the Meadow Face Stewardship Project is not likely to jeopardize the continued existence of Snake River steelhead This determination is based on a review of the current status of Snake River steelhead, the environmental baseline for the action area, the effects of the proposed action on steelhead habitat, and cumulative effects within the foreseeable future. In reaching this determination, NOAA Fisheries used the best scientific and commercial data available.

Streams affected by the proposed action presently support Snake River steelhead numbers that are far below estimated historic levels, with population growth rate (lambda) less than the replacement rate (declining rate of natural reproduction). Low fish densities in the action area occur partly from effects of past and present land uses in the action area, and partly from factors outside the action area (such as mainstem fish passage, and oscillations in population size due to fluctuating ocean conditions). Given these circumstances, jeopardy is avoided only through actions that contribute to improvements in baseline conditions, or through actions that do not perpetuate degraded baseline conditions. The stewardship project includes a mix of activities that may have either beneficial or adverse effects to listed fish, but an overall improvement in stream and watershed conditions is expected after the proposed action is completed. The expected overall improvement in the condition of steelhead habitat in the action area has the potential to increase the population growth rate, to the extent habitat quantity/quality are limiting the population growth.

Specific factors considered in reaching the non-jeopardy determination are:

(1) Near-term adverse effects of the proposed action are not likely to impede the long-term progress of impaired habitat toward properly functioning conditions; (2) the proposed action will not reduce survival of ESA-listed species; and (3) the proposed action is expected to contribute to the recovery of Snake River steelhead through long-term reductions in sediment and rehabilitation of riparian areas degraded by streamside roads.

E. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purpose of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species and critical habitat, or to develop additional information.

The potential for restoration of properly functioning stream conditions in the Meadow Face drainage is diminished by NPNF grazing activities that are not part of the proposed action. The proposed action includes provisions to prevent or minimize impacts of cattle to the areas where restoration will occur. However, continuation of existing levels of cattle grazing in the Meadow Face drainage is likely to inhibit recovery of riparian vegetation (as evidenced by heavy utilization of shrubs in certain locations), and perpetuate stream bank erosion, dispersal of noxious weeds, and sediment production from cattle trails. NOAA Fisheries recommends that the NPNF initiate efforts to either reduce the number of animal unit months (AUM), reduce the length of the grazing season, relocate the pastures, install fencing, or implement some combination of these to reduce grazing intensity to levels that will allow degraded riparian areas to recover.

F. Reinitiation of Consultation

This concludes formal consultation under the ESA on this action in accordance with 50 CFR 402.14(b)(1). As provided in 50 CFR 402.16, the NPNF is required to reinitiate consultation with NOAA Fisheries if: (1) the amount or extent of take specified in the Incidental Take Statement is exceeded; (2) new information or project monitoring reveals effects of the action that may affect steelhead or critical habitat in a manner or to an extent that was not considered in this Opinion; (3) the action is subsequently modified (including lack of accomplishment of offsetting mitigation) in a manner that causes an effect to steelhead or critical habitat that was not considered in this Opinion; or, (4) a new species is listed or critical habitat is designated that may be affected by the action.

IV. INCIDENTAL TAKE STATEMENT

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. "Harm" is defined as an act which actually kills or injures fish or wildlife, and may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering (50 CFR Part 222, October 1, 2001). Harass is not defined in the ESA, or by Federal regulations, but is defined in this document as an action that disrupts essential behavior patterns of a listed species, including, breeding, spawning, rearing, migrating, feeding or sheltering, to such an extent that fish are actually killed or injured. Incidental take is defined in the ESA as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the USFS so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered in this incidental take statement. If the USFS (1) fails to assume and implement the terms and conditions, or (2) fails to require any applicants, such as permit holders or contractors, to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

A. Amount or Extent of the Take

NOAA Fisheries anticipates that the proposed actions are reasonably certain to result in incidental take of juvenile Snake River steelhead through: (1) instream work activities, such as culvert replacements and stream restoration, that could kill, injure, harm or harass fish in the immediate work area; and/or (2) harm from sediment created from ground disturbances associated with road removal, soil restoration, prescribed fire, timber harvest, and road construction and reconstruction. The amount of this expected take is unquantifiable because the number of fish present when the activities occur cannot be predicted. The extent of incidental take is described in circumstances where the amount of take cannot be quantified (50 CFR 402.14 [i]).

The extent of take from instream work includes the fish bearing stream reaches immediately above and below each project location. A small number of juvenile steelhead may be harmed during instream work. The affected area is limited to 50 feet upstream to 50 feet downstream of the actual work site. The Meadow Face Ecosystem Analysis at the Watershed Scale (USDA 1999d) indicates the presence of approximately nine fish per 100 feet of stream, which allows a rough estimate of the number of fish exposed to a risk of take at each instream work site. Fish directly killed or injured during instream work is expected to be low because healthy fish typically disperse when disturbed by people or equipment. Mortality could occur from fish becoming stranded in temporarily dewatered channels, or by electrofishing or handling fish to move them. Take associated with electrofishing is authorized under the 4(d) rule (July 10, 2000; 65 FR 42422) associated with Idaho Fish and Games yearly research plan.

The extent of take from increased sediment includes all stream channel reaches in the Meadow Creek drainage that are downstream from ground disturbing activities. Harm would occur from effects of sediment deposition in spawning and rearing areas as discussed in section C (effects of the proposed action on Snake River steelhead) of this Opinion. The NPNF sediment model reports an increase as a percentage over the base (historic level) of sediment within the system. The maximum modeled percentage for all activities within this project area would result in a seven percent increase in current sediment levels that would decrease to below existing levels within 5 to 10 years. This estimate does not include the effects of activities such as cattle grazing, or account for variation in flow conditions, but it represents the upper limit of potential short-term impacts due to modeling all activities in a single year instead of over several years. With a fish/sediment statistical model, the NPNF indicated that the proposed activities would result in short-term decreases in spawning and rearing habitat, followed by long-term increases in these habitats.

In this Opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the species.

B. Reasonable and Prudent Measures

NOAA Fisheries believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to reduce the likelihood ana amount of take of Snake River steelhead resulting from actions covered by this Opinion. The NPNF shall:

1. Implement Best Management Practices (BMPs) to minimize negative impacts in the riparian area and stream channel.

2. Avoid or minimize take from instream work by excluding fish from instream work areas and avoiding spawning areas.

3. Monitor the implementation of the terms and conditions, and report any take that occurs from the Meadow Face project.

4. Prepare an annual monitoring report, and use the report as an adaptive management strategy to adjust activities based on monitoring results and new information regarding the effects of the Meadowface Stewardship Project on steelhead.

5. To expedite the balancing of sediment production with sediment reduction, ensure soil, stream, and riparian restoration activities, are implemented and timed prior to or concurrently with timber harvest, road/trail construction, and road/trail reconstruction.

C. Terms and Conditions

The following terms and conditions set forth the specific methods by which the RPM are to be accomplished. To be exempt from the prohibitions of section 9 of the ESA, the NPNF must comply with the following terms and conditions, which implement the RPMs described above. The measures described below are non-discretionary.

1. Terms and Conditions for RPM 1

The NPNF shall implement BMPs to minimize impacts in the riparian area and stream channel using the terms and conditions listed below. Many of these terms and conditions reinforce, and make explicit, the practices that are described in the BA, or that have been standard practices on the NPNF. Others are unique to this consultation and have been added by NOAA Fisheries.

a. Terms and Conditions Applicable to All Proposed Activities

(1) Review and approve designs and plans of operation for any activity implemented through private contract. Ensure designs and plans incorporate design criteria, BMPs, Forest Plan standards, and ESA requirements. Review will assure interdisciplinary participation and, as needed, participation of regulatory agencies.

(2) Restrict cattle use and distribution to protect recently disturbed or revegetated areas from trailing or trampling by cattle.

(a) Prevent cattle damage to restored areas by excluding or restricting cattle use of, or access to, restored areas until the vegetation has been reestablished to the point that the areas can withstand cattle use without damage to the soil or vegetation.

(b) Annually review project implementation schedule and identify areas/actions susceptible to impacts from cattle.

(c) Adjust annual operating instructions for active allotments to accommodate resource protection needs identified above. Adjustments may include avoidance of identified areas through fencing or herding or timing restrictions. Where avoidance is recommended, alternate grazing areas should be considered for use on a temporary basis.

(3) Minimize erosion and sedimentation on disturbed areas through use of approved standard methods and materials, such as weed free straw mulch, placement of woody debris or slash, application of seed (annual and native seed species), and planting shrubs and forbs. This would include using straw bales, silt fencing, or slash filter windrows on disturbed slopes adjacent to streams and seed mixes and vegetation species approved for use on the NPNF.

b. Terms and Conditions Applicable to Specific Activities

For the items in the following categories, the NPNF will:

(1) Road Decommissioning

(a) Reconstruct valley bottom and channel configurations to approximate the natural condition at all crossings. Ensure adequate channel width, slopes are returned to near natural contour, and stream grades returned to near natural condition. Install grade control structures if needed to meet objectives. Monitor implementation.

(b) Employ seasonal controls and timing, and contract requirements, regarding operating conditions of decommissioning activities, to minimize potential for sediment production, which may effect fish species life stages. A NPNF fisheries biologist will review the proposed decommissioning activities and contract requirements.

(2) Road Maintenance

(a) Comply with the requirements set out in the Programmatic Biological Assessment of the Road Management Program (USDA 1999a, pg. 118).

(b) Provide frequent ditch relief structures to prevent road drainage water from running long distances to live water and intermittent streams.

(3) Temporary Road Construction

(a) Construct roads to the minimum standard necessary to accommodate vehicle types, season of use, and resource protection.

(b) Establish vegetation (grass and forbs) on cut and fill slopes of roads that will be in place more than one season.

(c) Decommission temporary roads within three years following construction. Monitor implementation.

(d) Locate temporary roads to avoid live water and landslide prone terrain. If avoidance of live water is not possible, design stream crossings consistent with the design criteria for stream crossings described below, in the BA, and in the Forest Plan Amendment 20.

(e) Provide slash filter windrows where construction would provide benefits to nearby aquatic resources.

(f) Prohibit public motorized vehicle use and allow only contractor and administrative vehicles on temporary road segments.

(4) Culvert Replacement and Stream Crossings

(a) Provide for channel width, flow velocities, substrate condition, and stream gradients that approximate the natural channel and accommodate passage of fish and aquatic organisms. Consider and give preference to open-bottom arches and oversized culverts.

(b) Comply with Forest Plan Amendment 20, which requires adequate fish passage and capacity to accommodate 100-year flows.

(c) De-water culverts prior to replacement, when appropriate for the site.

(5) Trail Construction, Reconstruction and Maintenance

(a) Trails will be constructed outside of RHCAs, except for locations where the trail crosses a stream, or where construction in the RHCA results in less impact to the stream than locating the trail outside the RHCA.

(b) Site-specific effects of new trail stream crossings will be evaluated in the annual update of the subbasin BAs.

(c) Maintenance of trails will follow the mitigation and design criteria in the programmatic trail maintenance biological assessment for the South Fork Clearwater River (USDA 1999c).

(6) Fuel Haul, Storage and Spill Containment

(a) Prepare and implement a Spill Prevention Control and Countermeasures Plan (40 CFR 112) that incorporates the provisions described in the Meadow Face FEIS, prior to fuel hauling.

(7) Prescribed Fire

(a) Annually report prescribed fire activities and related monitoring results as called for in the Programatic Biological Assessment of the Fire Management Program (USDA 1999). If the monitoring shows effects that substantially differ from than those described in the BA, consultation will be re-initiated as described above in Section F. Reinitiation of Consultation.

(b) Comply with the requirements of the Programmatic Biological Assessment of Fire Management Activities (USDA 1999a, pg.97).

(8) Timber Harvest

(a) Apply streamside and wetland RHCAs consistent with Forest Plan Amendment 20.

(b) Remove no more than 20% of existing basal area and retain at least 120 square feet of basal area in Douglas fir/snowberry or drier habitat types and 180 square feet of basal area in Douglas fir/ninebark or moister habitat types within each acre of landslide prone area mapped or discovered during harvest unit layout. Apply the prescription evenly across the landslide prone acres and retain healthy trees with good rooting systems to maintain root strength across the slope. Active landslides and high-risk landslide prone areas would be avoided and buffered consistent with Forest Plan Amendment 20.

(c) Restrict ground-based logging and skidding equipment to slopes 30% and less except for small slope breaks within units.

(d) Use existing skid trails where feasible, otherwise designate skid trail locations to reduce soil compaction. In some situations where compacted soils on a trail or landing have created a small wetland (< 1 acre), use of the existing skid trail or landing may have fewer impacts than creating an additional trail or landing. Approval may be given on a case-by-case basis for use of existing skid trails or landings that have created wetlands. Approval will require a site visit by a fish biologist, hydrologist, or soils specialist.

(e) Locate log landings consistent with Forest Plan Amendment 20 to minimize impacts to riparian areas (see item 4, above, for special considerations).

(9) Exotic Vegetation Management

(a) Consult annually on weed treatment activities, until a programmatic consultation on weed treatments is developed. Thereafter the programmatic will be followed for all exotic vegetation management projects.

(10) Soil Restoration Activities

(a) Conduct soil restoration activities during the normal dry season, and restrict to periods when soil moisture and weather are unlikely to exacerbate soil compaction or sediment production from the restoration activities.

(b) Minimize disturbance from machinery by requiring hand work where machines would cause undue soil disturbance.

(c) Retain areas of intact, functioning riparian vegetation where possible.

(d) Protect disturbed areas with mulch, slash, or other ground cover, and use native seed or annual grasses to establish soil-stabilizing vegetation and prevent the spread of weeds. Apply seeds at the earliest opportunity for germination.

(11) Meadow Creek Slide Stabilization

(a) Conduct work during the normal dry season.

(b) Protect exposed soils with vegetation and mulch.

(12) Stream Restoration Activities

(a) Conduct stream restoration activities in periods when soil moisture and weather conditions are unlikely to exacerbate soil compaction or sediment production from the restoration activities.

(b) Minimize disturbance from machinery by designating access points and requiring hand work where machines would cause undue soil disturbance.

(c) Permit tree felling in RHCAs only where that action would not affect RMO for shade and woody debris recruitment. Tree felling within the RHCAs must have site-specific analysis to document that RMOs are maintained.

(d) Revegetate disturbed areas with native seed or annual grasses to establish soil-stabilizing vegetation and prevent the spread of weeds.

(e) Inspect heavy equipment daily to assure no leaking hydraulic fluid or fuel and oil exist.

(f) Perform equipment maintenance in a designated location at least 200 feet from live water.

(13) Developed and Dispersed Recreation

(a) Do not remove brush from streambanks, unless providing controlled access to the water.

(b) No materials will be discharged into live water.

(c) If hazard trees in RHCAs are needed to attain RMOs, as defined by PACFISH, they will be left on-site or will be felled with reasonable attempt to direct the tree into the stream to contribute to instream LWD.

2. Terms and Conditions for RPM 2

The NPNF will avoid or minimize take of fish from instream work areas through implementation of the following measures:

a. In streams with live water, conduct instream work activities between July 1, and August 15 to avoid sediment deposition on steelhead redds and to avoid disturbing adult salmon. The work window may be adjusted on a site-specific basis with Level 1 team approval.

b. If instream actions are likely to kill or injure steelhead, remove listed fish using electrofishing or nets, whichever approach is most effective in removing fish with the least potential for injury. Fish shall be safely transported downstream from the construction area, to the closest point where the fish are unlikely to be harmed by the instream activities.

3. Terms and Conditions for RPM 3

The NPNF will monitor implementation of the terms and conditions, and report any take that occurs from the Meadow Face project through the following measures:

a. Annually report compliance with implementation of the terms and conditions, a description of take occurring incidental to projects, and any environmental effects that were not considered in this Opinion.

b. Submit the monitoring report to: NOAA Fisheries, 102 N. College, Grangeville, Idaho 83530.

4. Terms and Conditions for RPM 4

The NPNF will prepare annual monitoring reports, and use the reports as part of an adaptive management strategy to adjust activities based on monitoring results and new information regarding the effects of the Stewardship Project on steelhead. Specifically NPNF will:

a. Adhere to the proposed monitoring as described in the Meadow Face Stewardship Project BA.

b. Annually report monitoring results as described in the Meadow Face Stewardship Project BA. The report shall identify in separate sections: (1) any results indicating adverse effects of the action on steelhead; (2) persistence of adverse conditions that could be improved through modification of the proposed action, or through additional actions; and (3) recommended remedies to address the problems identified in items (1) and (2).

c. Submit the reports to: NOAA Fisheries, 102 N. College, Grangeville, Idaho 83530.

5. Terms and Conditions for RPM 5

Ensure that activities that directly restore or improve fish habitat have priority for implementation, both in timing and extent, to ensure an upward trend in fish habitat/water quality. The NPNF will:

a. Track those project activities that have been completed, and those that are uncompleted in a display showing the following categories: (1) activities that directly restore or improve fish habitat, including road decommissioning, trail conversions, stream channel restoration, soil rehabilitation, slide stabilization, and culvert replacements, and (2) activities that do not directly restore or improve fish habitat, including road construction, timber harvest, and prescribed burns.

b. Establish checkpoints at years three, six, and nine of the project to evaluate the progress in each of the reporting categories above. Consider the level of accomplishment in each of the two categories. Determine to what level the activities in category 1 are progressing as compared to category 2 activities.

c. If implementation/completion of the activities that directly benefit fish (category 1) lags implementation/completion of category 2 activities (by percentage of tasks completed in each category or some similar relative measure), specify a course of action to balance activities in the out-years.

d. Submit checkpoint reports to: NOAA Fisheries, 102 N. College, Grangeville, Idaho 83530.

e. Reinitiate consultation, per 50 CFR 402.16, if the agency action is modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion.

V. MAGNUSON-STEVENS FISHERY CONSERVATION and MANAGEMENT ACT

A. Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

The EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH (§305(b)(2)), including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH. However, a written response is unnecessary for this action because the EFH conservation recommendations are fully explained in the Opinion, and they are mandatory under the terms and conditions of the Opinion.

B. Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*)(PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

C. Proposed Action

The proposed action is summarized above, in Section II, and described in detail in the Meadow Face Stewardship Pilot Project Environmental Impact Statement and BA. The proposed action and action area are detailed above in Section II of this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of chinook salmon. EFH for coho salmon occurs approximately 35 miles downstream from the mouth of Meadow Creek in the mainstem Clearwater River, however, juvenile coho salmon have been stocked in Meadow Creek in recent years.

D. Effects of the Proposed Action on EFH

This Opinion discusses in Section III. C.1, *Effects of the Proposed Action on Snake River Steelhead,* the direct, indirect, and cumulative effects of the proposed action on anadromous fish habitat in the action area. The habitat potentially used by Snake River steelhead encompasses salmon EFH in the Meadow Face drainage, therefore the effects of the proposed action on steelhead habitat and salmon EFH are virtually identical, except for factors involving timing of work activities, and the fact that salmon redds are more commonly found at lower steam gradients, downstream from steelhead redds.

The effects of the proposed action on EFH for salmon include both short-term and long-term effects. The principal short-term effects include increased turbidity and sedimentation during ground-disturbing activities, and for a few years following the disturbance. Long-term effects would persist for decades or longer, and include increased fish passage, improved riparian and watershed functions, and reductions in sediment. Refer to Section III. C. above for a more detailed discussion of effects.

E. Conclusion

NOAA Fisheries believes that the proposed action may adversely affect EFH for chinook salmon due to the short-term adverse effects of the project.

F. EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that may adversely affect EFH. NOAA Fisheries recommends that for EFH, the NPNF implement the same measures as the ESA conservation recommendations in section III.E, and terms and conditions in section IV.C.1-5.

G. Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. Such measures are fully described for those conservation recommendations in section IV.C.1-5, but are not fully described for recommendations in section III.E (grazing). Consequently, a written description is required of the measures that will be taken to either reduce the number of AUMs, reduce the length of the grazing season, relocate the pastures, or some implement some combination of these to reduce grazing intensity to levels that will allow degraded riparian areas to recover. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

H. Supplemental Consultation

The NPNF must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries EFH conservation recommendations (50 CFR 600.920(k)).

VI. REFERENCES

Benda, L. E., D. J. Miller, T. Dunne, G. H. Reeves and J. K. Agee. 1998. Dynamic Landscape Systems. Pages 261-288 In: R. J. Naiman and R. E. Bilby (editors). River Ecology and Management: Lessons from the Pacific Coastal Ecosystem. Springer- Verlag, New York, New York.

BRT (West Coast Steelhead Biological Review team). 1997. Status review update for West Coast steelhead from Washington, Idaho, Oregon, and California. Prepared for the National Marine Fisheries Service, Northwest Region. http://www.nwr.noaa.gov/1salmon/salmesa/pubs /sru970707.pdf

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NOAA Fisheries-NWFSC-27.

CBFWA (Columbia Basin Fish and Wildlife Authority), 2001. Draft Clearwater Subbasin summary. Submitted to the Northwest Power Planning Council, May 25, 2001.

Cramer, Steven P., C. W. Huntington, and C. R. Steward. 1998. Harvest of anadromous fishes lost by the Nez Perce Indian tribe as a result of Lewiston and Harpster dams in the Clearwater River basin. S.P. Cramer & Associates, Inc., Gresham, OR.

Everest, F.H., G.H. Reeves, J.R. Sedell, D.B. Hohler, and T. Cain. 1987. The effects of habitat enhancement on steelhead trout and coho salmon smolt production, habitat utilization, and habitat availablity in Fish Creek, Oregon, 1983-86. 1986 Annual Report, Bonneville Power Administration, Division of Fish and Wildlife Project 84-11, Portland, Oregon.

Fish Passage Center 2001a; http://www.fpc.org/adult_history/ytd-lgr.htm

Fish Passage Center 2001b; http://www.fpc.org/fpc_docs/200-01.pdf

Garcia, A. P. 2000. Spawning Distribution of Fall Chinook Salmon in the Snake River, Annual Report 1999, Report to Bonneville Power Administration, U. S. Fish & Wildlife Service, Contract No 98AI37776, Project No. 9801003, (BPA Report DOE/BP-37776).

Hall-Griswold, J. A. and C. E. Petrosky. 1996. Idaho habitat/natural production monitoring - part I: annual report 1995. Project Number 9 l-73, Contract Number DE-BI79-9 1 BP2 1182. Prepared for: U. S. Department of Energy, Bonneville Power Administration, Portland, OR.

Hicks, B.J., J.D. Hall, P.A. Bisson, and J.R. Sedell. 1991. Responses of salmonids to habitat changes. American Fisheries Society Special Publication 19:483-518.

Keifer, S., M. Rowe, and K. Hatch. 1992. Stock Summary Reports for Columbia River Anadromous Salmonids, Volume V: Idaho Final Draft for The Coordinated Information System. Idaho Department of Fish and Game, Boise, Idaho.

Koski, K.V. 1966. The survival of coho salmon (Oncorhynchus kisutch) from egg deposition to emergence in three Oregon coastal streams. Master's thesis. Oregon State University, Corvallis.

McClure, B. Sanderson, E. Holmes, C. Jordan, P. Kareiva, and P. Levin. 2000. Revised Appendix B of standardized quantitative analysis of the risks faced by salmonids in the Columbia River basin. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington. September.

Meehan, W.R., and D.N. Swanston. 1977. Effects of gravel morphology on fine sediment accumulation and survival on incubating salmon eggs. U.S. Forest Service Research Paper PNW-220.

Nez Perce Tribe and Idaho Department of Fish and Game. 1990. Clearwater River Subbasin Salmon and Steelhead Production Plan. Funded by the Northwest Power Planning Council; Columbia Basin Fish and Wildlife Authority.

NMFS. 1996. Making ESA Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. NOAA Fisheries, Environmental and Technical Services Division, Habitat Conservation Branch, Portland, Oregon. Available online at: <http://www.nwr.noaa.gov/1habcon/habweb /pubs/matrix.pdf>

NMFS. 1999. The Habitat Approach: Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. NOAA Fisheries, Northwest Region, Habitat Conservation Division, Portland, Oregon. Available online at: <http://www.nwr.noaa.gov/1habcon/habweb/pubs/newjeop9.pdf>

PFMC (Pacific Fishery Management Council). 1999. Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon. Amendment 14 to the Pacific Coast Salmon Plan.

Platts, W., R. Torquemada, M. McHenry, and C. Graham. 1989. Changes in salmon spawning and rearing habitat from increased delivery of fine sediment to the South Fork Salmon River, Idaho. Transactions of the American Fisheries Society 118:274-283.

Prichard, D., J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leonard, B. Mitchell, and J. Staats. 1998. Riparian Area Management: a user guide to assessing proper funtioning condition and the supporting science for lotic areas. TR 1737-15. Bureau of Land Management, BLM/RS/ST-98/001+1737. 136pp.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon. (Available from the National Marine Fisheries Service, Portland, Oregon). 356 p.

Stowell, Rick, et al. 1983. Guide for Predicting Salmonid Response to Sediment Yields in Idaho Batholith Watersheds. USDA Forest Service.

USDA. 1981. Guide for predicting sediment yields from forested watersheds.

USDA. 1987. Nez Perce National Forest Plan. Appendix A-7. Nez Perce National Forest, Grangeville, Idaho.

USDA. 1999. Proposal for Stewardship End Result Contracting. Nez Perce National Forest, Grangeville, Idaho.

USDA. 1999a. South Fork Clearwater biological assessment. Nez Perce National Forest, Grangeville, Idaho.

USDA. 1999b. Programmatic fisheries biological assessment for fire management activities. Nez Perce National Forest, Grangeville, Idaho.

USDA. 1999c. Programmatic trail maintenance biological assessment for the Salmon River. Nez Perce National Forest, Grangeville, Idaho.

USDA. 1999d. Meadow Face Ecosystem Analysis at the Watershed Scale. Nez Perce National Forest, Grangeville, Idaho.

Yount, J. D., and G. J. Niemi. 1990. Recovery of lotic communities and ecosystems from disturbance - a narrative review of case studies. Environmental Management 14(5):547-569.

Attachment A

BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS: SNAKE RIVER STEELHEAD

A.1 Status of Snake River Steelhead

The Snake River steelhead Evolutionary Significant Unit (ESU), listed as threatened on August 18, 1997, (62 FR 43937), includes all natural-origin populations of steelhead in the Snake River basin of southeast Washington, northeast Oregon, and Idaho. None of the hatchery stocks in the Snake River basin are listed, but several are included in the ESU. Critical habitat was designated for Snake River steelhead on February 16, 2000, (65 FR 7764).

A.1.2 General Life History

Steelhead can be divided into two basic run-types based on the state of sexual maturity at the time of river entry and the duration of the spawning migration (Burgner et al. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, whereas others only have one run-type.

In the Pacific Northwest, summer steelhead enter fresh water between May and October (Busby et al. 1996; Nickelson et al. 1992). During summer and fall, prior to spawning, they hold in cool, deep pools (Nickelson et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration in early spring to natal streams, and then spawn (Meehan and Bjornn 1991; Nickelson et al. 1992). Winter steelhead enter fresh water between November and April in the Pacific Northwest (Busby et al. 1996; Nickelson et al. 1992), migrate to spawning areas, and then spawn in late winter or spring. Some adults, however, do not enter coastal streams until spring, just before spawning (Meehan and Bjornn 1991). Difficult field conditions (snowmelt and high stream flows) and the remoteness of spawning grounds contribute to the relative lack of specific information on steelhead spawning.

Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying and most that do so are females (Nickelson et al. 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby et al. 1996). Multiple spawnings for steelhead range from three percent to 20% of runs in Oregon coastal streams.

Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986; Everest 1973). Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation. Cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity (Giger 1973) are required to reduce disturbance and predation of spawning steelhead. Summer steelhead usually spawn further upstream than winter steelhead (Withler 1966; Behnke 1992).

Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching. Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992).

Juveniles rear in fresh water from 1 to 4 years, then migrate to the ocean as smolts. Winter steelhead populations generally smolt after 2 years in fresh water (Busby et al. 1996). Steelhead typically reside in marine waters for 2 or 3 years prior to returning to their natal stream to spawn at 4 or 5 years of age. Populations in Oregon and California have higher frequencies of age-1-ocean steelhead than populations to the north, but age-2-ocean steelhead generally remain dominant (Busby et al. 1996). Age structure appears to be similar to other west coast steelhead, dominated by 4-year old spawners (Busby et al. 1996).

Based on purse seine catches, juvenile steelhead tend to migrate directly offshore during their first summer rather than migrating along the coastal belt as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986).

A.1.3 Population Dynamics and Distribution

The following section provides specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) of the Snake River ESU. Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

The longest consistent indicator of steelhead abundance in the Snake River basin is based on counts of natural-origin steelhead at the uppermost dam on the lower Snake River. The abundance of natural-origin summer steelhead at the uppermost dam on the Snake River has declined from a 4-year average of 58,300 in 1964 to an average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and again declined during the 1990s (Figure A-1).

These broad scale trends in the abundance of steelhead were reviewed through the Plan for Analyzing and Testing Hypotheses (PATH) process. The PATH report concluded that the initial, substantial decline coincided with the declining trend in downstream passage survival. However, the more recent decline in abundance, observed over the last decade or more, does not coincide with declining passage survival but can be at least partially be accounted for by a shift in climatic regimes that has affected ocean survival (Marmorek and Peters 1998).

The abundance of A-run versus B-run components of Snake River basin steelhead can be distinguished in data collected since 1985. Both components have declined through the 1990s, but the decline of B-run steelhead has been more significant. The 4-year average counts at Lower Granite Dam declined from 18,700 to 7,400 beginning in 1985 for A-run steelhead and from 5,100 to 900 for B-run steelhead. Counts over the last 5 or 6 years have been stable for A-run steelhead and without significant trend (Figure A-2). Counts for B-run steelhead have been low and highly variable, but also without apparent trend (Figure A-3).

Comparison of recent dam counts with escapement objectives provides perspective regarding the status of the ESU. The management objective for Snake River steelhead stated in the Columbia River Fisheries Management Plan was to return 30,000 natural/wild steelhead to Lower Granite Dam. The All Species Review (TAC 1997) further clarified that this objective was subdivided into 20,000 A-run and 10,000 B-run steelhead. Idaho has reevaluated these escapement objectives using estimates of juvenile production capacity. This alternative methodology lead to revised estimates of 22,000 for A-run and 31,400 for B-run steelhead (pers. comm., S. Keifer, Idaho Department of Fish and Game with P. Dygert, NOAA Fisheries).

The State of Idaho has conducted redd count surveys in all of the major subbasins since 1990. Although the surveys are not intended to quantify adult escapement, they can be used as indicators of relative trends. The sum of redd counts in natural-origin B-run production subbasins declined from 467 in 1990 to 59 in 1998 (Figure A-4). The declines are evident in all four of the primary B-run production areas. Index counts in the natural-origin A-run production areas have not been conducted with enough consistency to permit similar characterization.

Idaho has also conducted surveys for juvenile abundance in index areas throughout the Snake River basin since 1985. Parr densities of A-run steelhead have declined from an average of about 75% of carrying capacity in 1985 to an average of about 35% in recent years through 1995 (Figure A-5) Further declines were observed in 1996 and 1997. Parr densities of B-run steelhead have been low, but relatively stable since 1985, averaging 10% to 15% of carrying capacity through 1995. Parr densities in B-run tributaries declined further in 1996 and 1997 to 11% and eight percent respectively.

Figure A-1. Adult Returns of Wild Summer Steelhead to the Uppermost Dam on the Snake River

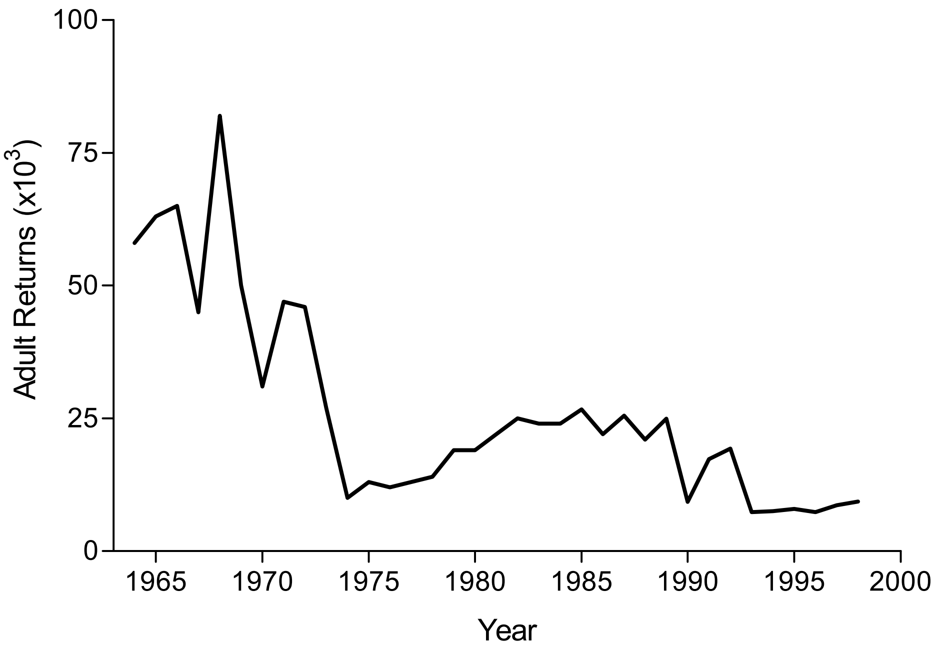
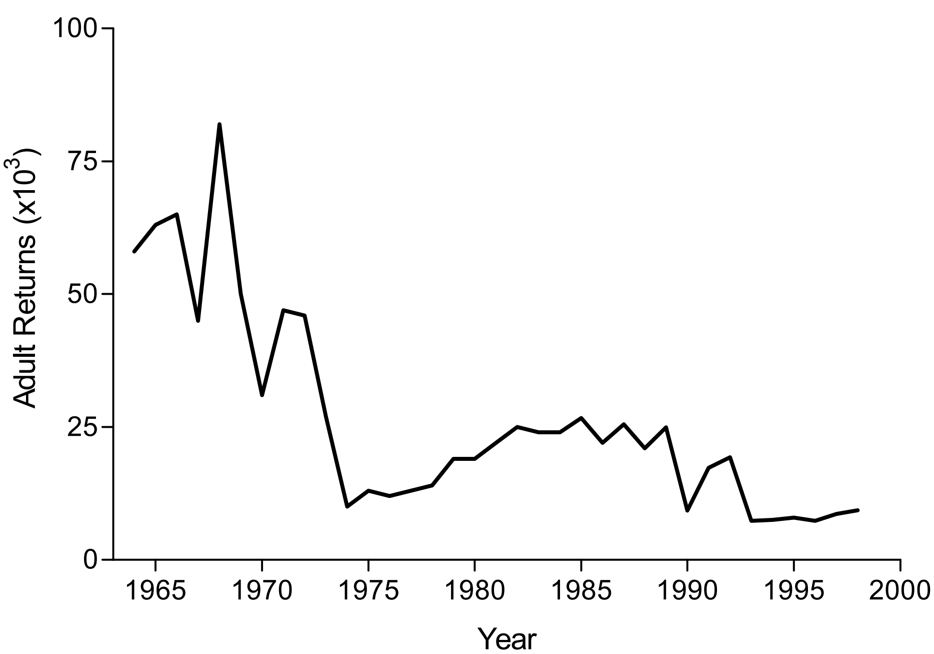


Figure A-2. Escapement of A-Run Snake River Steelhead to the Uppermost Dam1[4]



[4]Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in (TAC 1997). Data for 1985 through 1998 from Table 2 of Section 8 (TAC 1997) and pers. comm. G. Mauser, IDFG.

Figure A-3. Escapement of B-Run Snake River Steelhead to the Uppermost Dam[1]

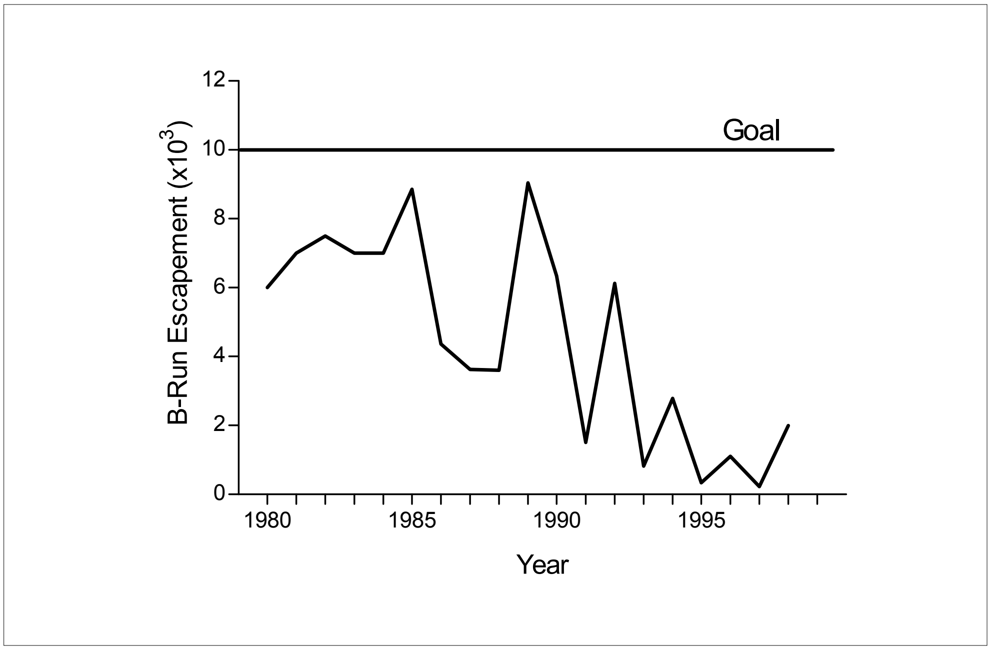
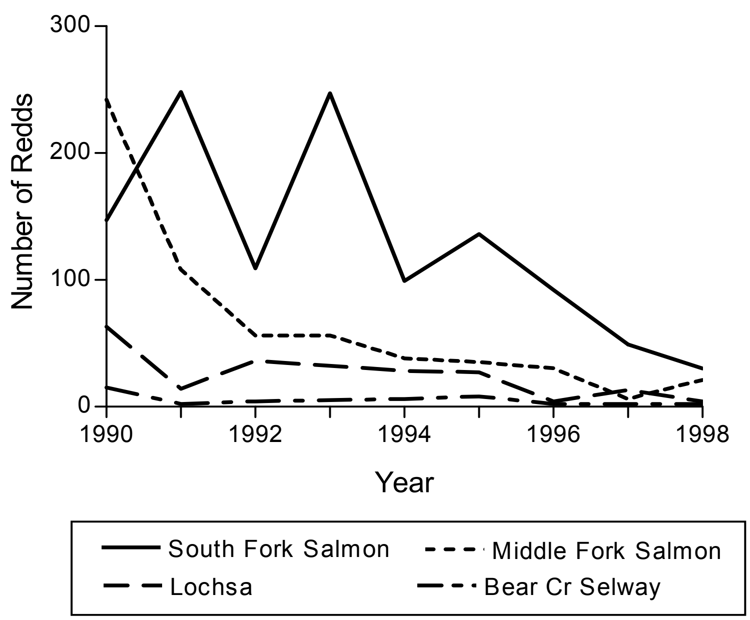


Figure A-4. Redd Counts for Wild Snake River (B-Run) Steelhead in the South Fork and Middle Fork Salmon, Lochsa, and Bear Creek-Selway Index Areas

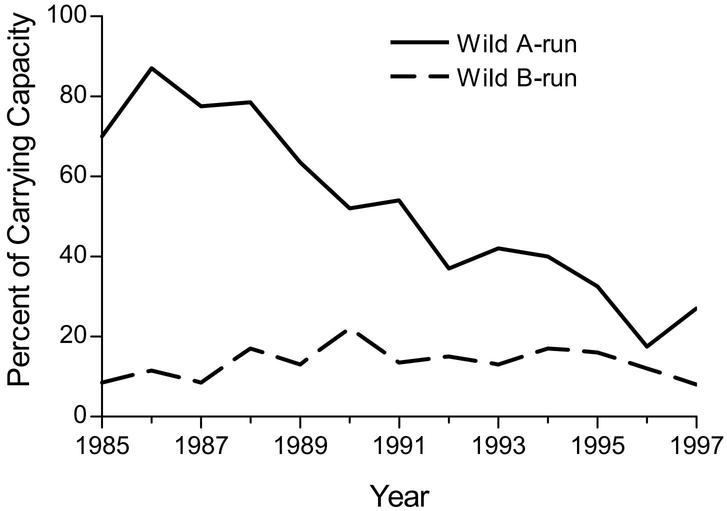


Data for the Lochsa exclude Fish Creek and Crooked Fork.
Sources: memo from T. Holubetz (IDFG), "1997 Steelhead Redd Counts", dated May 16, 1997, and IDFG, unpubl. data).

---

[1]Source: Data for 1980 through 1984 from Figures 1 and 2 of Section8 in (TAC 1997). Data for 1985 through 1998 from Table 2 of Section 8 (TAC 1997) and pers. comm. G. Mauser, IDFG.

Figure A-5. Percent of Estimated Carrying Capacity for Juvenile (Age 1+ and 2+) Wild A- and B-Run Steelhead in Idaho Streams



Source: Data for 1985 through 1996 from (Hall-Griswold and Petrosky 1998); data for 1997 from IDFG (unpublished).

It is apparent from the available data that B-run steelhead are much more depressed than the A-run component. In evaluating the status of the Snake Basin steelhead ESU it is pertinent to consider whether B-run steelhead represent a "significant portion" of the ESU. This is particularly relevant because the Tribes have proposed to manage the Snake River basin steelhead ESU as a whole without distinguishing between components and further that it is inconsistent with National Marine Fisheries Service (NOAA Fisheries) authority to manage for components of an ESU.

It is first relevant to put the Snake River basin into context. The Snake River historically supported over 55% of total natural-origin production of steelhead in the Columbia basin and now has approximately 63% of the basin's natural production potential (Mealy 1997). B-run steelhead occupy four major subbasins including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon), areas that for the most part are not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives for B-run steelhead of 10,000 (TAC 1997) and 31,400 (Idaho). B-run steelhead therefore represent at least 1/3 and as much as 3/5 of the production capacity of the ESU.

B-run steelhead are distinguished from the A-run component by their unique life history characteristics. B-run steelhead were traditionally distinguished as larger and older, later-timed fish that return primarily to the South Fork Salmon, Middle Fork Salmon, Selway, and Lochsa rivers. The recent review by the Technical Advisory Committee (TAC) concluded that different populations of steelhead do have different size structures, with populations dominated by larger fish (i.e., greater than 77.5 cm) occurring in the traditionally defined B-run basins (TAC 1999). Larger fish occur in other populations throughout the basin, but at much lower rates (evidence suggests that fish returning to the Middle Fork Salmon and Little Salmon are intermediate in that they have a more equal distribution of large and small fish).

B-run steelhead are also generally older. A-run steelhead are predominately age-1-ocean fish whereas most B-run steelhead generally spend two or more years in the ocean prior to spawning. The differences in ocean age are primarily responsible for the differences in the size of A- and B-run steelhead. However, B-run steelhead are also thought to be larger at age than A-run fish. This may be due, at least in part, to the fact that B-run steelhead leave the ocean later in the year than A-run steelhead and thus have an extra month or more of ocean residence at a time when growth rates are thought to be greatest.

Historically, a distinctly bimodal pattern of freshwater entry could be used to distinguish A-run and B-run fish. A-run steelhead were presumed to cross Bonneville Dam from June to late August whereas B-run steelhead enter from late August to October. The TAC reviewed the available information on timing and confirmed that the majority of large fish do still have a later timing at Bonneville; 70% of the larger fish crossed the dam after August 26, the traditional cutoff date for separating A- and B-run fish (TAC 1999). However, the timing of the early part of the A-run has shifted somewhat later, thereby reducing the timing separation that was so apparent in the 1960s and 1970s. The timing of the larger, natural-origin B-run fish has not changed.

As pointed out above, the geographic distribution of B-run steelhead is restricted to particular watersheds within the Snake River basin (areas of the mainstem Clearwater, Selway, and Lochsa Rivers and the South and Middle Forks of the Salmon River). No recent genetic data are available for steelhead populations in South and Middle Forks of the Salmon River. The Dworshak National Fish Hatchery (NFH) stock and natural populations in the Selway and Lochsa Rivers are thus far the most genetically distinct populations of steelhead in the Snake River basin (Waples et al. 1993). In addition, the Selway and Lochsa River populations from the Middle Fork Clearwater appear to be very similar to each other genetically, and naturally produced rainbow trout from the North Fork Clearwater River (above Dworshak Reservoir) clearly show an ancestral genetic similarity to Dworshak NFH steelhead. The existing genetic data, the restricted geographic distribution of B-run steelhead in the Snake (Columbia) River basin, and the unique life history attributes of these fish (i.e. larger, older adults with a later distribution of run timing compared to A-run steelhead in other portions of the Columbia River basin) clearly support the conservation of B-run steelhead as a biologically significant component of the Snake River ESU.

Another approach to assessing the status of an ESU being developed by NOAA Fisheries is to consider the status of its component populations. For this purpose a population is defined as a group of fish of the same species spawning in a particular lake or stream (or portion thereof) at a particular season, which to a substantial degree do not interbreed with fish from any other group spawning in a different place or in a the same place at a different season. Because populations as defined here are relatively isolated, it is biologically meaningful to evaluate the risk of extinction of one population independently from any other. Some ESUs may be comprised of only one population whereas others will be constituted by many. The background and guidelines related to the assessment of the status of populations is described in a recent draft report discussing the concept of Viable Salmonid Populations (McElhany et al. 2000).

The task of identifying populations within an ESU will require making judgements based on the available information. Information regarding the geography, ecology, and genetics of the ESU are relevant to this determination. Although NOAA Fisheries has not compiled and formally reviewed all the available information for this purpose, it is reasonable to conclude that, at a minimum, each of the major subbasins in the ESU represent a population within the context of this discussion. A-run populations would therefore include at least the tributaries to the lower Clearwater, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde, Imnaha, and possibly the Snake mainstem tributaries below Hells Canyon Dam. B-run populations would be identified in the Middle Fork and South Fork Salmon rivers and the Lochsa and Selway rivers (major tributaries of the upper Clearwater), and possibly in the mainstem Clearwater River, as well. These basins are, for the most part, large geographical areas and it is quite possible that there is additional population structure within at least some of these basins. However, because that hypothesis has not been confirmed, NOAA Fisheries assumes that there are at least five populations of A-run steelhead and five populations of B-run steelhead in the Snake River basin ESU. Escapement objectives for A and B-run production areas in Idaho, based on estimates of smolt production capacity, are shown in Table A-1.

Table A-1. Adult Steelhead Escapement Objectives Based on Estimates of 70% Smolt Production Capacity

A-Run Production Areas		B-Run Production Areas	
Upper Salmon	13,570	Mid Fork Salmon	9,800
Lower Salmon	6,300	South Fork Salmon	5,100
Clearwater	2,100	Lochsa	5,000
Grand Ronde	(1)	Selway	7,500
Imnaha	(1)	Clearwater	4,000
Total	**21,970**	**Total**	**31,400**

Note: comparable estimates are not available for populations in Oregon and Washington subbasins.

Hatchery populations, if genetically similar to their natural-origin counterparts, provide a hedge against extinction of the ESU or of the gene pool. The Imnaha and Oxbow hatcheries produce A-run stocks that are currently included in the Snake River basin steelhead ESU. The Pahsimeroi and Wallowa hatchery stocks may also be appropriate and available for use in developing supplementation programs; NOAA Fisheries required in its recent biological opinion on Columbia basin hatchery operations that this program begin to transition to a local-origin broodstock to provide a source for future supplementation efforts in the lower Salmon River (NMFS 1999). Although other stocks provide more immediate opportunities to initiate supplementation programs within some subbasins, it may also be necessary and desirable to develop additional broodstocks that can be used for supplementation in other natural production areas. Despite uncertainties related to the likelihood that supplementation programs can accelerate the recovery of naturally spawning populations, these hatchery stocks provide a safeguard against the further decline of natural-origin populations.

The Dworshak NFH is unique in the Snake River basin in producing a B-run hatchery stock. The Dworshak stock was developed from natural-origin steelhead from within the North Fork Clearwater River, is largely free of introductions from other areas, and was therefore included in the ESU although not as part of the listed population. However, past hatchery practices and possibly changes in flow and temperature conditions related to Dworshak Dam have lead to substantial divergence in spawn timing of the hatchery stock compared to what was observed historically in the North Fork Clearwater River, and compared to natural-origin populations in other parts of the Clearwater basin. Because the spawn timing of the hatchery stock is much earlier than it was historically (Figure A-6), the success of supplementation efforts using these stocks may be limited. In fact, past supplementation efforts in the South Fork Clearwater River using Dworshak NFH stock have been largely unsuccessful, although improvements in out-planting practices have the potential to yield different results. In addition, the unique genetic character of Dworshak NFH steelhead noted above will limit the degree to which the stock can be used for supplementation in other parts of the Clearwater subbasin and particularly in the Salmon River B-run basins. Supplementation efforts in those areas, if undertaken, will more likely have to rely on the future development of local broodstocks. Supplementation opportunities in many of the B-run production areas will be limited in any case because of logistical difficulties in getting to and working in these high mountain, wilderness areas. Because opportunities to accelerate the recovery of B-run steelhead through supplementation, even if successful, are expected to be limited, it is essential to maximize the escapement of natural-origin steelhead in the near term.

Finally, the conclusions and recommendations of the TAC's All Species Review are pertinent to this review of the status of Snake River steelhead. Considering information available through 1996, the 1997 All Species Review stated:

> Regardless of assessment methods for A and B steelhead, it is apparent that the primary goal of enhancing the upriver summer steelhead run is not being

> achieved. The status of upriver summer steelhead, particularly natural-origin fish, has become a serious concern. Recent declines in all stocks, across all measures of abundance, are disturbing.
>
> There has been no progress toward rebuilding upriver runs since 1987. Throughout the Columbia River basin, dam counts, weir counts, spawning surveys, and rearing densities indicate natural-origin steelhead abundance is declining, culminating in the proposed listing of upriver stocks in 1996. Escapements have reached critically low levels despite the relatively high productivity of natural and hatchery rearing environments. Improved flows and ocean conditions should increase smolt-adult survival rates for upriver summer steelhead. However, reduced returns in recent years are likely to produce fewer progeny and lead to continued low abundance.
>
> Although steelhead escapements would have increased (in some years substantially) in the absence of mainstem fisheries, data analyzed by the TAC indicate that effects other than mainstem Columbia River fishery harvest are primarily responsible for the currently depressed status and the long term health and productivity of wild steelhead populations in the Columbia River.
>
> Though harvest is not the primary cause of declining summer steelhead stocks, and harvest rates have been below guidelines, harvest has further reduced escapements. Prior to 1990, the aggregate of upriver summer steelhead in the mainstem Columbia River appears at times to have led to the failure to achieve escapement goals at Lower Granite Dam. Wild Group B steelhead are presently more sensitive to harvest than other salmon stocks, including the rest of the steelhead run, due to their depressed status and because they are caught at higher rates in the Zone 6 fishery.

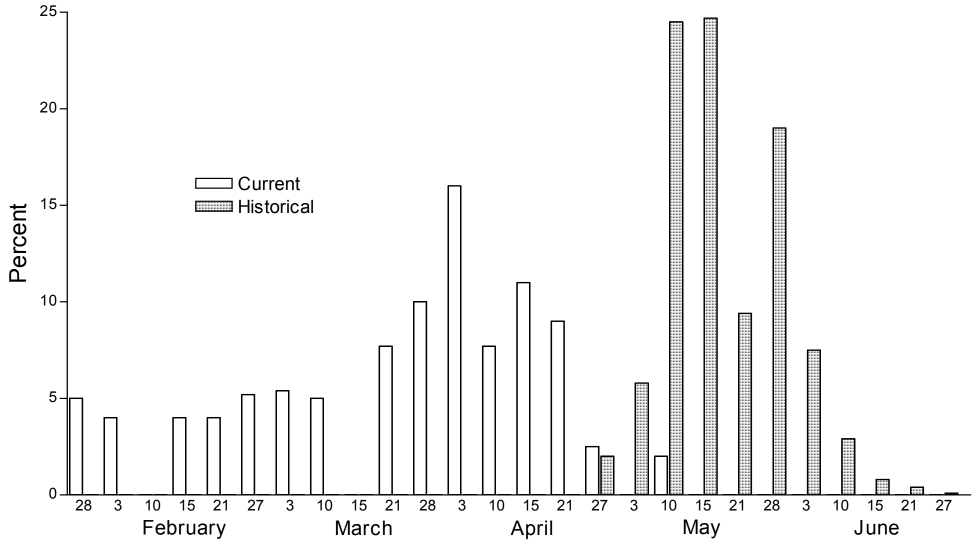
Small or isolated populations are much more susceptible to stochastic events such as drought and poor ocean conditions. Harvest can further increase the susceptibility of such populations. The Columbia River Fish Management Plan (TAC 1997) recognizes that harvest management must be responsive to run size and escapement needs to protect these populations. The parties should ensure that TAC 1997 harvest guidelines are sufficiently protective of weak stocks and hatchery broodstock requirements.

The All Species Review included the following recommendations:

- Develop alternative harvest strategies to better achieve rebuilding and allocation objectives.

- Consider modification of steelhead harvest rate guidelines relative to stock management units and escapement needs.

Figure A-6. Historical Versus Current Spawn-Timing of Steelhead at Dworshak Hatchery



For the Snake River steelhead ESU as a whole, the lambda from years1980-1997, ranges from 0.91 - 0.70, depending on the assumed number of hatchery fish reproducing in the river (Tables B-2a and B-2b in McClure et al. 2000). NOAA Fisheries estimated the risk of absolute extinction for A- and B-runs, based on assumptions of complete hatchery spawning success, and no hatchery spawning success. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (Table B-5 in McClure et al. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs (Table B-6 in McClure et al. 2000).

NOAA Fisheries has also calculated the proportional increase in the average growth rate of each run that would be needed to reduce the risk of absolute extinction within 100 years to five percent (Tables A-2a through A-2d; Appendix B in McClure et al. 2000). Assuming that the effectiveness of hatchery fish has been zero, the needed change in the growth rate of the wild population ranges from 0.01 for A-run steelhead to 0.02 for the B run (Table A-2a). The maximum needed change in growth rate rises as high as 470% for B-run steelhead if hatchery-origin spawners have been 100% as effective as wild fish (Table A-2d).

Table A-2a. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish did not reproduce.

	Initial		Risk of Extinction		Change in lambda		Risk of a 90% Decline	
Species ESU	**Pop. Size**	**lambda**	**24-Year**	**100-Year**		**24-Year**	**100-Year**	**24-**
Steelhead								
Snake River ESU								
A-run	299,161	0.91	0.00	0.12	0.000	0.010	0.42	1.00
B-run	100,455	0.92	0.00	0.35	0.000	0.020	0.38	1.00

Table A-2b. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish have been 20% as productive as spawners of wild-origin.

		Initial		Risk of Extinction		Change in lambda		Risk of a 90% Decline	
Species ESU	**Stream**	**Pop. Size**	**lambda**	**24-Year**	**100-Year**	**24-Year**	**100-Year**	**24-Year**	**100-Year**
Steelhead									
Snake River ESU									
A-run		299,161	0.52	0.99	1.00	0.360	0.835	1.00	1.00
B-run		100,455	0.48	1.00	1.00	0.480	0.965	1.00	1.00

Table A-2c. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish have been 80% as productive as spawners of wild-origin.

			Initial		Risk of Extinction		Change in lambda		Risk of a 90% Decline	
Species	ESU	Stream	Pop. Size	lambda	24-Year	100-Year	24-Year	100-Year	24-Year	100-Year
Steelhead										
	Snake River ESU									
		A-run	299,161	0.23	1.00	1.00	2.170	3.285	1.00	1.00
		B-run	100,455	0.20	1.00	1.00	2.515	3.765	1.00	1.00

Table A-2d. Estimated initial population size in the Dennis model analyses for individual stocks, average population growth rate (lambda), risk of absolute extinction and the proportional change in lambda needed to reduce the risk of extinction to five percent, and the risk of a 90% decline in abundance (source: Appendix B in McClure et al. 2000). This analysis incorporates the proportion of natural spawners that were of hatchery-origin but assumes that hatchery fish have been 100% as productive as spawners of wild-origin.

			Initial		Risk of Extinction		Change in lambda		Risk of a 90% Decline	
Species	ESU	Stream	Pop. Size	lambda	24-Year	100-Year	24-Year	100-Year	24-Year	100-Year
Steelhead										
	Snake River ESU									
		A-run	299,161	0.19	1.00	1.00	2.765	4.100	1.00	1.00
		B-run	100,455	0.17	1.00	1.00	3.185	4.695	1.00	1.00

REFERENCES

Barnhart, R. A. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)–steelhead. U.S. Fish and Wildlife Service, Biological Report 82 (11.60).

Behnke, R. J. 1992. Native trout of western North America. American Fisheries Society Monograph 6, Bethesda, Maryland.

Burgner, R. L., J. T. Light, L. Margolis, T. Okazaki, A. Tautz, and S. Ito. 1992. Distribution and origins of steelhead trout (Oncorhynchus mykiss) in offshore waters of the North Pacific Ocean. International North Pacific Fish Commission Bulletin 51.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L. J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-27. August.

Everest, F. H. 1973. Ecology and management of summer steelhead in the Rogue River. Oregon State Game Commission, Fisheries Research Report 7, Corvallis.

Giger, R. D. 1973. Streamflow requirements of salmonids. Oregon Wildlife Commission, Final Report (Project AFS-62-1), Portland.

Hall-Griswold, J. A., and C. E. Petrosky. 1998. Idaho habitat/natural production monitoring. Part 1: general monitoring subproject. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Annual Report 1996 (Project 91-73), Portland, Oregon.

Hartt, A. C., and M. B. Dell. 1986. Early oceanic migrations and growth of juvenile Pacific salmon and steelhead trout. International North Pacific Fisheries Commission Bulletin 46:1-105.

Marmorek, D. R., and C. N. Peters, editors. 1998. Plan for analyzing and testing hypotheses (PATH): preliminary decision analysis report on Snake River spring/summer chinook. ESSA Technologies Ltd., Vancouver, B.C.

McClure, B. Sanderson, E. Holmes, C. Jordan, P. Kareiva, and P. Levin. 2000. Revised Appendix B of standardized quantitative analysis of the risks faced by salmonids in the Columbia River basin. National Marine Fisheries Service, Northwest Fisheries Science Center, Seattle, Washington. September.

McElhany, P., M. Ruckelshaus, M. J. Ford, T. Wainwright, and E. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. National Marine Fisheries Service, Northwest Fisheries Science Center, Draft Report, Seattle, Washington. January 6.

Mealy, S. P. 1997. Letter re: State of Idaho's comments on the proposed listing of Snake River steelhead for protection under the Federal Endangered Species Act. Idaho Department of Fish and Game. February 11.

Meehan, W. R., and T. C. Bjornn. 1991. Salmonid distributions and life histories. Pages 47-82 *in* W. R. Meehan, editor. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19, Bethesda, Maryland.

Nickelson, T. E., J. W. Nicholas, A. M. McGie, R. B. Lindsay, D. L. Bottom, R. J. Kaiser, and S. E. Jacobs. 1992. Status of anadromous salmonids in Oregon coastal basins. Oregon Department of Fish and Wildlife, Research and Development Section, Corvallis, and Ocean Salmon Management, Newport, Oregon.

NMFS (National Marine Fisheries Service). 1999. Biological opinion on artificial propagation in the Columbia River basin—incidental take of listed salmon and steelhead from Federal and non-Federal hatchery programs that collect, rear, and release unlisted fish species. NMFS, Endangered Species Act Section 7 consultation. March 29.

TAC (Technical Advisory Committee). 1997. All species review, 1996—summer steelhead: Columbia River fish management plan. TAC for U.S. v. Oregon. August 4 (tables 8-11 updated).

TAC (Technical Advisory Committee). 1999. Minutes of meeting May 4-5, 1999. TAC for U.S. v. Oregon.

Waples, R. S., O. W. Johnson, P. B. Aebersold, C. K. Shiflett, D. M. VanDoornik, D. J. Teel, and A. E. Cook. 1993. A genetic monitoring and evaluation program for supplemented populations of salmon and steelhead in the Snake River Basin. Report to the U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, contract DE-A179-89BP00911.

Withler, I. L. 1966. Variability in life history characteristics of steelhead trout (Salmo gairdneri) along the Pacific coast of North America. Journal of the Fisheries Research Board of Canada 23:365-393.